This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at http://books.google.com/

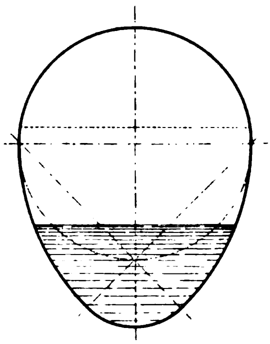
CANAL & CULVERT TABLES.

JACKSON.

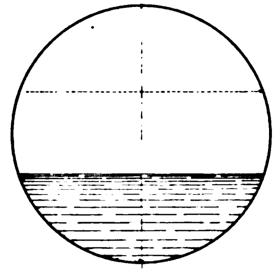
Indian Institute, Oxford.

67 D 37

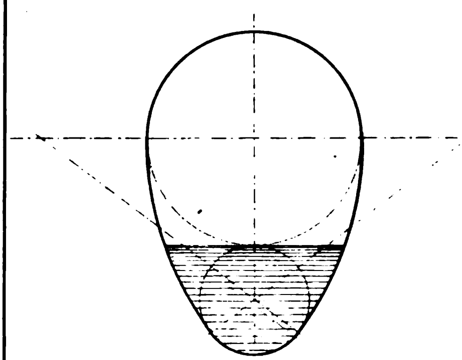
SECTIONS OF CULVERTS AND CANALS



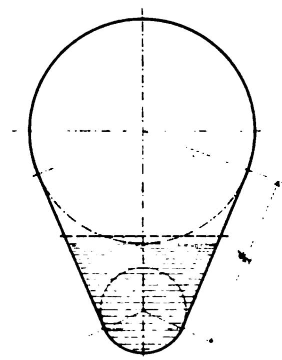
Hawksley's Ovoid Section.



Cylindrical.



Phillips' or Metropolitan Ovoid.



Jacksons Pegtop Section.

Canal in Rock or Masonry

Canal in Earth

For Explanation See Pages 388 and 396.

L. J. Del.

PRESENTED BY THE
SECRETARY OF STATE
FOR INDIA

CANAL AND CULVERT TABLES,

BASED ON THE FORMULA OF KUTTER,

UNDER A

MODIFIED CLASSIFICATION,

WITH EXPLANATORY TEXT AND EXAMPLES,

BY

LOWIS D'A. JACKSON, A-M.I.C.E.
AUTHOR OF "HYDRAULIC MANUAL AND STATISTICS,"
"THE SIMPLIFICATION OF WEIGHTS AND MEASURES," AND OTHER WORKS.

LONDON:
WILLIAM H. ALLEN AND CO.,
13 WATERLOO PLACE, PALL MALL, S.W.

1878.

All rights reserved.

PRINTED BY W. H. ALLEN AND CO., 13 WATERLOO PLACE, PALL MALL.

PREFACE.

These Tables have been calculated in accordance with a modification of the velocity-formula of Herr Kutter, of Berne, now recognized in England, as well as elsewhere, as the most correct. As the greater part of them apply to Canals, the work of calculation has been expressly carried out at the desire of the Government of India; the portions applicable to Culverts perhaps alone being likely to become of very frequent use in England.

The First Part, or Computing Tables, has been twice calculated by myself with the seven-figure logarithms of Dupuis' Edition of Callet; the Second Part, or Final Results, was computed partly by logarithms, but the values of V and Q were obtained mechanically from calculated values of C and $100\sqrt{RS}$ by means of two arithmometers of Thomas de Colmar; the one an excellent machine supplied by Mr. Redfern, the other the property of the India Office.

The amount of precision in the latter part is much superior to that originally contemplated; but

it must be borne in mind that these are not mathematical tables, but tables intended principally for the practical purposes of determining velocities and discharges of water, on which gradation of quality of surface and irregularity of course produce so important an effect that errors of one per cent. may almost be disregarded at present. Until lately errors of even 30 and 50 per cent. in such quantities have been allowed to pass unnoticed: but there are now many evidences of a change of spirit in the profession at home; the kaleidoscopic variations performed on the Rivers Pollution Reports, the distaste for bestowing the purple on the wealthiest, and the strong movement for removing the keys of eminence from prætorian hands, indicate fresh tendencies which may eventually result in substituting thought and ability for the knowledge of conventionalities that now passes for skill, in rendering financing and trading-attorney qualities of less esteem, and in developing more scientific engineers capable of grappling with the difficulties of hydraulic science, hitherto so much neglected in this country.

L. D'A. J.

Royal Institution,
20th July, 1878.

ERRORS.

Table I.,	page 56,	*under*	N=0·011,	*for* M 0·5262,	*read* 0·5261.
Table II.,	„ 66,	„	R=9·5,	„ C 1·9770,	„ 1·9777.
„	„ 75,	„	R=11·0,	„ C 1·2714,	„ 1·2614.
„	„ 77,	„	R=8·5,	„ C 1·0671,	„ 1·0670.
Table III.,	„ 90,	„	R=2·5,	„ 100 $\sqrt{RS}$ 7·905,	*read* 7·906.
Table IV.,	„ 103,	„	Diam. 2′ 10″,	*for* R 0·769,	*read* 0·759.
„	„ 104,	„	Bed-width 5·0	„ A 17·25,	„ 17·5.
„	„ 109,	„	„ 240	„ R 5·604,	„ 5·714.
„	„ 138,	„	Diameter 2′ 6″	„ Q 63·83,	„ 53·83.
Table VI.,	„ 141,	„	„ 4′ 8″	„ C 1·555,	„ 1·556.
„	„ 151,	„	„ 2′ 10″	„ C 1·463,	„ 1·493.
„	„ 152,	„	„ 6′ 0″	„ Q 223·6,	„ 223·7.
Table VII.,	„ 163,	„	„ 2′ 2″	„ Q 16·01,	„ 17·01.
„	„ 177,	„	„ 2′ 8″	„ Q 21·51,	„ 21·55.
Table VIII.,	„ 184,	„	Depth 2·0,	*for* { V 5·01,	„ 4·71.
				{ Q 40·08,	„ 37·68.
„	„ 185,	„	„ 3·0, „	Q 47·39,	„ 45·39.
„	„ 186,	„	„ 1·0, „	V 0·05,	„ 0·95.
„	„ 201,	„	„ 5·5, „	V 3·398,	„ 5·398.
„	„ 201,	„	„ 8·0, „	{ V 4·586,	„ 4·662.
				{ Q 2201,	„ 2238.
„	„ 202,	„	„ 2·5, „	{ V 1·302,	„ 1·063.
				{ Q 260·4,	„ 212·6.
„	„ 204,	„	„ 4·0, „	C 0·087,	„ 1·087.
„	„ 211,	„	„ 9·0, „	V 7·245,	„ 3·622.
Table IX.,	„ 216,	„	„ 1·25, „	Q 6·300,	„ 6·350.
„	„ 217,	„	„ 1·5, „	{ V ·8086,	„ ·8087.
				{ Q 5·458,	„ 5·459.
„	„ 219,	„	„ 4·0, „	V 49·70,	„ 4·970.
„	„ 220,	„	„ 4·0, „	V 11·23,	„ 1·123.
„	„ 221,	„	„ 2·5, „	V 2·918,	„ 2·968.
„	„ 222,	„	„ 3·5, „	V 23·30,	„ 2·330.
„	„ 222,	„	„ 1·0, „	V ·3475,	„ ·3465.
„	„ 225,	„	„ 6·0, „	{ V 1·601,	„ 1·201.
				{ Q 227·3,	„ 158·5.
„	„ 226,	„	„ 3·0, „	V 0·149,	„ 1·149.
„	„ 228,	„	„ 3·0, „	V 242·0,	„ 2·420.
„	„ 237,	„	„ 9·0, „	V 3·382,	„ 4·382.
„	„ 238,	„	„ 3·5, „	V 1·551,	„ 3·551.
„	„ 246,	„	„ 4·5, „	Q 280·8,	„ 2118·5.
„	„ 249,	„	„ 10·0, „	{ V 5·037,	„ 4·537.
				{ Q 8562·9,	„ 7713·2.
Table X.,	„ 277,	„	„ 7·0, „	Q 439·4,	„ 454·4.
Table XI.,	„ 316,	„	„ 0·75, „	{ V 1·129,	„ 0·906.
				{ Q 2·325,	„ 1·866.
„	„ 320,	„	„ 1·0, „	Q 5·742,	„ 5·712.
„	„ 320,	„	„ 2·0, „	{ V 1·880,	„ 1·790.
				{ Q 30·08,	„ 28·64.
„	„ 355,	„	„ 12·, „	{ V 3·082,	„ 3·406.
				{ Q 8580,	„ 9483.
„	„ 356,	„	„ 2·, „	{ V 2·429,	„ 1·842.
				{ Q 1176,	„ 891·5.

OMISSIONS.

Table VIII., page 189.—Values of Q:—

	Depth 4·5.	Depth 5·0.
S 2·0	397·2	458·6
1·5	344·0	397·1
1·0	281·0	324·3
0·8	251·0	290·0
0·6	217·6	251·2
0·4	177·2	204·9
0·3	153·3	177·2
0·2	124·7	144·5
0·1	87·7	101·7
0·05	61·40	71·34

Table VIII., page 198, *under* Depth 5·0 *insert* Q 1591·.

Table IX., page 247, *under*

		Depth 8·0.	Depth 9·0.
S 0·4	V	4·959	
	Q	5871·5	
	C	0·919	
0·35	V	4·649	V 4·980
	Q	5504·4	Q 6678·2
	C	0·921	C 0·935
0·3	V	4·313	
	Q	5106·6	
	C	0·923	

Table IX., page 353, *under* S 0·25, Depth 12 { V 5·114, Q 13010·, C 0·981

„ „ 355, *under* S 0·25, Depth 12 { V 5·141, Q 14313·, C 0·982

Table XI., page 337, *under* S 0·4, Depth 9·0 { V 4·197, Q 2984, C 0·769

„ „ 339, „ S 0·4, Depth 9·0 { V 4·250, Q 3404, C 0·771

SUMMARY OF CONTENTS.

GENERAL NOTATION.

Q = quantity of water discharged in cubic feet per second,
V = mean velocity of discharge in feet per second,
V_x = corresponding maximum velocity at the same section,
A = sectional area,
P = sectional perimeter, exclusive of the water surface,
R = the hydraulic radius $= \frac{A}{P}$,
L = a longitudinal length in the direction of flow,
H = the fall in any such length,
S = the sine of the hydraulic slope or gradient $= \frac{H}{L}$,
W = a transverse width at water surface across flow,
D = a vertical depth from the water surface,
B = a bottom breadth, or bed-width of a section;

N = the coefficient of roughness and irregularity;
$M = N\left(41{\cdot}6 + \frac{0{\cdot}00281}{S}\right)$, a combined variable,
C = the coefficient of mean velocity.

All dimensions used in this book, when not otherwise mentioned, are in English feet; all velocities are in feet per second, and discharges in cubic feet per second. Values of **N** are given in thick antique type, and values of C in old-style figures.

INTRODUCTION.

THE scientific engineer, that wishes to use a correct formula for calculating discharges and velocities in rivers, canals, and culverts of drainage, first inquires what fully recorded experimental observations exist by which its accuracy may be tested.

There is, doubtless, a large number of scattered and incomplete observations, wanting in detail, limited in scope, and carried out in such multifarious ways, as not to admit of collocation and similar treatment as bases for formulæ. Besides these, there are practically only three sets of observations available for the purpose. The first, the well known series of D'Arcy-Bazin experiments on small channels; the second, the Humphreys and Abbott series on very large rivers; the third, a small selection from observations made by various scientific men on rivers and channels that happen to have sufficient similarity in detail to enable them to be used in juxtaposition, among which may be mentioned the Ganguillet-Kutter Swiss series with high declivities. Beyond these there is but little on a sufficiently large range to be of much value; while anything else that may be gradually obtained

in future must be marshalled with the rest without undue prominence.

Under these circumstances the only alternative modes of procedure are very evident. The one is to use separate formulæ for small channels, for moderate rivers and for very large rivers, for low inclinations and for high inclinations, for natural channels and for artificial channels; and again for various materials used as linings, or surfaces in artificial channels, and for various conditions of surface and irregularity in natural channels;—all which formulæ must be in accordance with their respective sets of experiments. The other alternative is to combine the results into one or two formulæ without sacrificing correctness.

Any other plan would be manifest absurdity; for if we apply the D'Arcy-Bazin formula to very large rivers, or the Humphreys-Abbott formula to small channels, or the Eytelwein formula to Swiss hill streams with high declivities and rough beds, they are found to fail utterly.

Of the two alternatives, therefore, the former is undoubtedly the better plan for scientific men who anticipate future progress, and are working with that view; while the latter is better for the rougher and readier purposes of the purely practical man, who wishes to make early use of the results of the labor of scientific men at as small a cost and in as short a time as possible.

As to combined formulæ, the author is at present aware of only one that at all satisfies the conditions of a general formula, and that is the one adopted in

this book—that of Herr Kutter. It can, with sufficient care and judicious application of coefficients, be made to adapt itself to channels of every description up to the Mississippi, with any degree of declivity and any condition or quality of surface.

If this formula has its defects, and it certainly is not absolutely perfect, those are yet considerably less than that of any other formula that has hitherto been brought forward for such general and comprehensive purposes; and, besides, they happen to be of a nature affecting the practical man but slightly.

In the first place, as regards rivers, more especially those of large dimensions, it involves a careful choice of a range of coefficients of roughness of surface and irregularity varying between **0·020** and **0·035**; that is, it practically causes rivers to be divided into sixteen classes, and forces a choice to be made among them which is certainly at present rather difficult, and will remain so until we have a greater number of fully recorded observations on rivers to refer to for guidance. Theoretically, no doubt, Herr Kutter has divided all rivers and canals in earth into three classes; but as this classification (as will be shown further on, under the head of coefficients of roughness and irregularity) appears to fail entirely with rivers, we are forced back to the more practical sixteen classes. These constitute a difficulty rather than a defect, which will gradually be remedied in time by the supply of additional hydraulic statistics.

But the purely practical man deals much more

with the discharges and velocities of canals and culverts than with those of rivers; so that this first difficulty does not much affect him.

In the second place, as regards canals in earth of various conditions, the classification of Herr Kutter into three numbered classes is certainly rather misleading (as will be explained further on, under the head of coefficients of roughness and irregularity); but as the formula itself may be used independently of this, and remains unimpaired, the obvious remedy is to adopt an improved classification for canals in earth. The modification introduced for this purpose, which is carried throughout this book, is hereafter explained, and will, it is hoped, be considered to remove this defect.

In the third place, the formula being rather long and involved, calculations of velocity and of discharge made direct from the formula, are rather tedious; while the converse process of working back from discharges and velocities to dimensions and gradients is exceedingly so. This, again, is not a defect in the formula, but a difficulty arising from the nature of things, in accordance with which the formula has been made. For this difficulty the following tables are proposed as a remedy, and it is hoped that they will be found such by those that use the English tongue and the English measures.

THE FORMULA OF KUTTER.

THE formula of Kutter, when applied to English feet, is Kutter's formula of discharge for English measures.

$$Q=\left\{\frac{\frac{1\cdot811}{N}+41\cdot6+\frac{0\cdot00281}{S}}{1+\left(41\cdot6+\frac{0\cdot00281}{S}\right)\frac{N}{\sqrt{R}}}\right\}A\sqrt{RS}$$

the terms of which have been explained in the General Notation.

It has been generally accepted in this form, and is so given in his work, "Die neuen Formeln für die Bestimmung der mittlern Geschwindigkeit des Wassers in Canälen und Flüssen."*

At first sight it certainly appears a cumbersome and unwieldy formula, more especially to those who have been accustomed to deal with such formulæ as $Q=A\,.\,100\sqrt{RS}$, or $Q=A\,.\,92\cdot4\sqrt{RS}$, &c., for such purposes; but on reflection, and after considering that these latter formulæ and all of their type having fixed or nearly fixed coefficients of mean velocity are only suited to very narrow limits, it seems surprising that any formula suited to general application, from rivers as large as the Mississippi down to mere trenches of supply, should not be more troublesome in form and application.

In point of fact the formula seems to have been Kutter's formula of

* Vieweg, Braunschweig, 1870.

discharge for metrical measures.

originally rounded to suit metrical measures; and for such purposes its form

$$Q=\frac{\frac{1}{N}+\left(23+\frac{0\cdot00155}{S}\right)}{1+\left(23+\frac{0\cdot00155}{S}\right)\frac{N}{\sqrt{R}}}\,.\,A\sqrt{RS}.$$

is more simple; and this, when reduced to English measures by means of the proper commercial equivalent of the metre at 62° Fahr., 3·2818 (and not that at 32°, 3·2808, which scientific equivalent is manifestly incorrect for practical purposes), would render the corresponding term 41·6 in the foregoing, really 41·66,—a slight difference, which may now be ignored on the score of the formula having been already so much used with the term 41·60, as above given,—and the disadvantages resulting from so slight a change outweighing the advantages.

The next idea that arises on seeing this formula is, that it appears capable of simplification without altering its values; in fact, that the large involved factor admits of reduction.

Intermediate variables adopted by Kutter.

It certainly does so, and Kutter uses it for metrical measures in the "Zeitschrift des Oesterreichischen Ingenieur und Architektenvereins" for 1869, in the form $\frac{z\sqrt{R}}{x+\sqrt{R}}$, which certainly admits of no further reduction that would add to convenience, but already, by merging the two practical variables N and S into new combinations, z and x, rather adds to the difficulties of handling the formula, and gives a half-way step that involves the use of two additional intermediate sets of quantities of extensive range.

It might, perhaps, seem that the following reduction would be more convenient in practice, Reduction of the formula.

$$Q = \frac{1{\cdot}811 + N\left(41{\cdot}6 + \frac{0{\cdot}00281}{S}\right)}{\sqrt{R} + N\left(41{\cdot}6 + \frac{0{\cdot}00281}{S}\right)} \cdot \frac{AR}{N} \sqrt{S}$$

But this again, though using the direct value of R for the bulk of the value of the formula, does not entirely remove $\sqrt{R}$ from the fraction, and causes the inconvenience of making the resulting values of the latter, or new coefficients, decrease for increased values of R, which is manifestly objectionable.

If, however, we leave the time-honoured factor $\sqrt{RS}$ untouched, we can, by introducing a variable,

$$M = N\left(41{\cdot}6 + \frac{0{\cdot}00281}{S}\right)$$

which corresponds to the x of Kutter for metrical measures, put the formula into the form Convenient form with one intermediate variable.

$$Q = \frac{\sqrt{R}}{N}\left(\frac{M + 1{\cdot}811}{M + \sqrt{R}}\right) \cdot A\sqrt{RS}$$

which has the advantage of having only one variable term M in addition to the inevitable practical constituents; and is also adapted to logarithmic computation.

With the view of facilitating computations of the original formula, more especially for cases of rivers, in which the value of N should be assigned with some nicety, a tabulated set of values of M is given in Table I., pages 56 to 61 inclusive. They correspond to a practical range of values of S and N,

and from them values of C, the coefficient of mean velocity, can be computed for any case.

The coefficients of mean velocity, used in this book.

As regards these values of C, it has certainly been very much the custom hitherto to use them in whole numbers; but as, if the general formula

$$Q=C'A.\sqrt{RS},$$

be put into the form

$$Q=C.A.100\sqrt{RS},$$

where $C=\frac{C'}{100}$, we obtain the three advantages—1st, of throwing the square of 100 into the last factor, and thus bringing the values of S, which are often very small, more prominently forward in the calculation; 2nd, that of taking values of $100\sqrt{RS}$, which represent the old D'Aubuisson formula when $C=1$, as points of departure for mental guidance in velocities; and, 3rd, that of making $C=1$ a point of departure, or known intermediate position among the values of C, whose range extends from 0·281 to 2·241 for culverts and canals. Considering these three advantages to outweigh the former custom, the tabular values of C adopted in this book are hence values of the expression

$$C=\frac{\sqrt{R}}{100\,N}\cdot\left(\frac{M+1{\cdot}811}{M+\sqrt{R}}\right)$$

The author may be pardoned for explaining at full length an almost sufficiently obvious arrangement, which is as often adopted as not, and is applied in his previous works on hydraulics, as he was once much astonished by receiving a letter

from a civil engineer residing at a great distance, to the effect that his coefficients of mean velocity were wrong! The civil engineer in question had neglected the 100 in his calculations.

Returning to the computation of values of C from the formula, by the aid of the tabulated values of M., it may be noticed that this is further facilitated by the values of $\frac{M}{N}$ and $\frac{1 \cdot 811}{N}$ given on page 62, Table I., which are necessarily far less numerous than the former; and thus the labor is reduced to a minimum. The computation of values of C will, however, be entirely saved by the succeeding table, in which any case may be interpolated, excepting those rivers, or when some special value of N is used which is not adopted in them. In either case, the values of the expression $100\sqrt{RS}$, given in Table III., pages 87 to 97, may be used to arrive at the required mean velocity of discharge, Its computation.

Values of the expression $100\sqrt{RS}$.

$$V = C \, . \, 100\sqrt{RS}.$$

Finally, as regards the future of the Kutter formula itself, apart from the degrees of roughness of surface and irregularity estimated with it, which are mentioned in the following paragraph, there seems little chance of its undergoing any very important modification for some years to come. It certainly does not make any allowance for variation of the force of gravity, which might be expected when we consider that this must have some effect on the discharge of rivers of large dimensions under varying latitudes; nor does it draw any distinctions

Improbability of modification of the original formula.

for the specific gravity of the fluid under consideration, whether pure water or liquid charged with sediment, or heavy semifluid drainage or sewage; while, again, the effect of bends and sinuosities of all sorts is not taken into account separately, but combined with that of other irregularities and qualities of surface, in one and the same coefficient. Distinctions or allowances on these accounts have to be deferred at present for want of special experiment; in the meantime the formula answers the general purposes for which it was intended.

THE COEFFICIENTS OF ROUGHNESS AND IRREGULARITY.

Disbelievers in friction.

THESE coefficients have constituted a stumbling-block to a large proportion of English civil engineers, who, owing to some statements made before the Institution in 1854 to the effect that "*it did not matter whether the inside of a pipe or the bed of a watercourse or river were rough or smooth,*" have cherished this idea up till comparatively recently in spite of the experiments of continental engineers, and the consequent opinion to the contrary of the above of their more enlightened professional brethren at home.

It is, perhaps, almost superfluous to remark that had these misguided individuals trusted more to their own judgment and common sense, or to that of others if they had none, and less to a veneration for the so-called importance and position, or, more truthfully, the gold and brass, that carry so much weight with them in statements made at that assembly,—they would not have adhered so long to this very absurd delusion.

Bazin's coefficients of smoothness.

The coefficients of smoothness or roughness seem first to have taken practical and tangible shape, though only to a small degree as regards number, from the experiments of D'Arcy and Bazin, set forth in the "Recherches Hydrauliques," 1865. There four grades only are advocated, namely:—

1st. Very smooth surfaces of pure cement and planed timber.

2nd. Smooth surfaces of ashlar, brickwork, and ordinary planking.

3rd. Moderately smooth surfaces of sections constructed in rubble.

4th. Sections in earth of all kinds.

These four degrees of smoothness appeared not sufficiently comprehensive to Kutter, who began by adding to them a fifth, which was based on his own experiments in Switzerland on hill streams, blocked with detritus, or covered with vegetation.*

5th. Sections in earth, blocked with detritus, or overgrown with vegetation.

And these five degrees of roughness would have

* The influence of vegetation was previously noticed by Girard.

remained and become classic probably without further addition for many years had not Herr Kutter entered into a thorough investigation of all recorded experiments and hydraulic observations, from those on the Mississippi, with low gradients and mighty volumes, down to the pettiest rills with steep gradients and dimensions of 3 inches, in canton Graubündten; which resulted in the formula now well known and appreciated as the first really comprehensive formula of any value.

Local values of Kutter's coefficients of roughness and irregularity.

The local values of N, the coefficients of roughness and irregularity of channel resulting from the examination of this extensive series, are given on pages 52 and 53, Table I. of this book, to serve as an answer to cavillers, a nucleus for further additions by coadjutors, and an aid to progressists in hydraulic science. It will further be of use to those who wish to choose values of N independently for themselves in such practical cases as they may have to deal with.

With these and, probably, also, other local values of N before him, Herr Kutter did not hesitate to extend and interpolate the foregoing degrees of roughness, and assign values to them which suited his formula. These general or approximately mean values of N, as suited to various materials and conditions, are twelve in number, as follow:—

General values of Kutter's coefficients of roughness and irregularity.

1. Well planed timber . . . **0·009**
2. Plaster in pure cement . . **0·010**
3. Plaster in cement one-third sand **0·011**
4. Unplaned timber . . . **0·012**

5. Ashlar and brickwork in good order	0·013
6. Canvas lining on frames . .	0·015
7. Rubble in good order . .	0·017
8. Rubble in a damaged state .	0·020

Canals in very firm gravel. .	0·020
I. Rivers and canals in earth in perfect order and regimen, perfectly free from stones and weeds .	0·025
II. Rivers and canals in earth in moderate order and regimen, moderately free from stones and weeds	0·030
III. Rivers and canals in earth in bad order and regimen, overgrown or impeded by detritus . .	0·035

This is, no doubt, considerably in advance of the preceding four categories of Bazin; and though it would be far from the author's intention or wish to disparage so important a contribution to hydraulic science as this of Herr Kutter, yet it would be in vain to conceal that something more is yet to be desired. It seems unfortunate that Herr Kutter had not the time or opportunity for further research at that time which might have resulted in extending this series to other materials, such as earthenware, glazed and unglazed, cast and wrought iron, painted or coated, and in various conditions; as, for want of positive information with regard to these mate-

The assumption of additional general values for other materials.

rials so commonly used in works of drainage, we have been compelled in this work to assume coefficients of roughness suitable to them by comparison with those already given by him, and apply them in the ensuing tables of velocity and discharge.

Thus, with reference to glazed materials of all kinds, while one would be inclined to assign to them a coefficient of roughness equal to that for planed timber, 0·009, yet, as the continuity of pipes on an extensive scale is never perfect, but presents an additional source of roughness, it has been thought better to assume 0·010 as more correct for practical purposes in series of glazed pipes. Arguing in a similar way as regards ordinary plain cast-iron pipes and their want of perfect continuity, and wrought-iron pipes and their projections, they may be considered to be practically not quite so smooth as unplaned timber, but rather less so. Hence the next coefficient, that for ashlar, 0·013, has been assumed as applicable to them.

The omission of some general values.

On the other hand, as these tables are not intended to apply to temporary constructions of timber either planed or otherwise, or of canvas on frames, the special consideration of these materials has been omitted from this work; and again, the allowance for the difference of roughness resulting from an admixture of one-third of sand to cement is also not carried out; for it is probable that this coarse cement-mortar would seldom be used in the event of its effect in diminution of velocity being known, especially as the use of cement is always limited to

very moderate lengths of canal, such as aqueducts and short passages.

Values of N adopted for artificial materials in this book.

The values of N for artificial materials in good order used in this work are consequently limited to—

CLASS 1.	Smooth plaster and glazed material	0·010
CLASS 2.	Ashlar, brickwork, cast and wrought iron, unglazed pottery . .	0·013
CLASS 3.	Rubble	0·017

For the same materials in bad order and condition, the next lower coefficient of roughness is used. Thus, for materials mentioned in Class 1, when in bad order, the coefficient 0·013 of Class 2 would be used; and for materials mentioned in Class 2, when in bad order, the coefficient 0·017 of Class 3 would be adopted; and for materials mentioned in Class 3, when in bad order, a coefficient of 0·020 would be used, which, again, is identical with that adopted for the highest class of earthwork, firm and well secured gravel. This arrangement will be found to be in strict accordance with the local values of N for damaged materials given by Kutter, collated at page 53. The general values of N thus adopted in this work are given on pages 54 and 55, Table I.

Kutter's classification of rivers and canals in earth.

Proceeding to the general values of N for earthwork of various conditions as given by Kutter, it may be noticed that he combines rivers and canals irrespectively of the natural and artificial forms of

their beds and banks; that he places them all in three classes, with a fourth unnumbered one for canals in firm secured gravel; that of these three numbered classes, he places Class I., N=0·025, as suitable to all rivers and canals in perfect order and regimen; Class III., N=0·035, as suitable to all rivers and canals in bad order and regimen, with detritus to a large degree, or overgrown with weeds; and then simply places Class II., N=0·030, as a moderate or intermediate class for rivers and canals of all sorts. This arrangement has been carried out in Kutter's Tables of Velocity and Discharge, and adhered to throughout his works on the subject. It has consequently also been hitherto adopted in "The Hydraulic Manual," and the translation of Kutter's work "The New Formula," with its tables for metrical quantities.

A later and more careful consideration of this arrangement, in combination with a few Indian data, collated by the author during his experience on Indian works of irrigation, and some investigations in connection with designs for large canals in another country, in addition to a comparison of facts and figures obtained from various sources, have led him to imagine that, while this arrangement is undoubtedly a very vast improvement on that of Bazin, which gives only one class of coefficients of roughness and irregularity for earthwork in canals and rivers of all sorts, it yet admits of considerable improvement.

Investigation of the local values of N for earth.

In the first place, it appears that these classes are not sufficiently in accordance with the very in-

stances adduced by Kutter, see Local Values, pages 52 and 53, which have been arranged for natural and artificial channels separately in this book; and an examination of these, if made with the object of classifying canals from a practical point of view, will probably bear out the following comments.

The values of N for artificial channels in rammed gravel and earth are shown to vary between 0·0163 and 0·0301, if we except the single case of the Chesapeake-Ohio Canal, which is mentioned as rounded, and possibly is little better than a natural channel at that particular spot. Now, a very much worn canal in such a condition can hardly be classed as a canal at all for the purposes of this investigation —the elimination of results for usual practical objects,—but may rather be quoted as a curious exceptional case, out of the ordinary run of circumstances. This case may certainly, then, be discarded, unless more similar ones of a better condition can be brought forward in support of it. Taking, then, the range of values of N for artificial channels in gravel and earth to extend from 0·0163 to 0·0301, and comparing this with the range of values of N for natural channels or rivers, which is from 0·0200 to 0·0350, it at once strikes one that, although the range of those for the former is about the same as that of those for the latter, the values of those for the former are nearly 0·005 higher than those for the latter at both extremes. And the fact of only two cases being given for natural channels in which the value of N is near 0·035 does not militate against

this; for everyone will acknowledge that there must be thousands of cases in nature very similar and corresponding to the Simme at Lenk and the Rhine at Domleschgerthal. Hence, if we take an average of the values of N for artificial channels, it will be somewhere between **0·0225** and **0·0250**; while that of those for the natural channels will be about **0·0275**; a most important difference.

Again, it appears indefensible that Herr Kutter should assume **0·025** to be a coefficient of roughness and irregularity suited to a canal in perfect order and regimen, when that actually obtained on the Linth Canal is **0·0222**, and that on a canal in England, also in earth (not gravel), is **0·0184**! An application of these classes to various canal data by the author also leads to the same conclusion to which the local values point, namely, that the three classes adopted by Herr Kutter are on too low a scale for canals generally,* although they, together with the fourth unnumbered class $N=0·020$, seem very well chosen with reference to rivers, if these require any such classes.

The non-suitability of any such classification to rivers.

In order to examine whether they do so, let us take the Mississippi as an example, and see how closely the value of N should be used in order to obtain a tolerably correct velocity of discharge.

In this case $R=72$ feet, and $S=0·00002$, giving $\sqrt{R}=8·485$ and $100\sqrt{RS}=3·795$. And if we try Classes I. and II. of Kutter, and even intermediate values of N as well, we shall obtain errors in the values of V resulting, which, when multiplied by

* Replies from several scientific engineers support this opinion.

the enormous sectional area of the channel, would produce serious errors in the discharge thus calculated.

Making use of the tabular values in Table I., and applying them in the formula,— Example.

$$V=\frac{\sqrt{R}}{N}\cdot\frac{M+1\cdot811}{M+\sqrt{R}}\cdot\sqrt{RS}$$

$N=0\cdot025$	$N=0\cdot027$	$N=0\cdot028$	$N=0\cdot030$
$M=4\cdot5525$	4·9127	5·0988	5·4630
$\frac{M}{N}=182\cdot10$	182·10	182·10	182·10
$\frac{1\cdot811}{N}=72\cdot44$	67·07	64·68	60·37
$\frac{M+1\cdot811}{N}=254\cdot54$	249·17	246·78	242·47
$M+\sqrt{R}=13\cdot0375$	13·4977	13·5838	13·9480
0·928 6518	0·928 6518	0·928 6518	0·928 6518
2·405 7560	2·396 4958	3·392 3100	2·384 6580
3·334 4078	3·325 1476	3·320 9618	3·313 3098
1·115 1943	1·130 2630	1·133 0213	1·144 5119
2·219 2135	2·194 8846	2·187 9405	2·168 7979
·579 2118	·579 2118	·579 2118	·579 2118
·798 4253	·774 0964	·767 1523	·748 0097
$C=1\cdot657$	1·567	1·541	1·475
$V=6\cdot2867$	5·9442	5·8499	5·5978

whereas the true value of V is 5·93, and it corresponds to a value of N of nearly 0·0275, and of C of about 1·562.

In this case, therefore, which is certainly an extreme one, the classes are of no use whatever; and the coefficient of roughness requires adaptation. The same also occurred at the International Basle-Rhine series of observations; and, probably, in many

other cases. The author may, therefore, be considered justified in concluding that the classes of Kutter, and, in fact, any small number of classes corresponding to them, are inapplicable to rivers and natural channels, and that for them it is better to apply a special value of N, either through comparison with the nearest similar case, or by means of preliminary experiment.

The defects in Kutter's classification of canals.

The same objection does not, however, apply to the use of classes for artificial channels in earth; and, although the classes adopted by Herr Kutter for them are not sufficiently satisfactorily borne out by the instances quoted by him, the following modification of them will be found to be well supported by them, as well as some others.

Allowing the class $N = 0.0200$ to remain and represent the highest and rather exceptional condition of roughness and irregularity in canals in earth, $N = 0.0300$ the lowest, and $N = 0.0250$ a moderate fair average order of condition,* we obtain three marked representative classes. But these are hardly sufficient; for if, after all this nicety of the formula, which makes allowance for varying values of the hydraulic gradient S, as well as for those of the hydraulic radius R, and indicates very marked differences in the resulting values of C, we confine ourselves to the use of such coarse values of a very ill-defined quantity N as to sweep away the results of this refinement and precision, we should be committing a serious mistake.

Illustration.

That such would be the case will be at once seen

* This corresponds with Bazin's single earthwork class.

by examining the values of C given on pages 22 and 23, under the heads of **0·020**, **0·025**, and **0·030**.

For instance, under the low hydraulic gradient of 0·0001, which is of common occurrence in canals with hydraulic radii of 6 and 7 feet; the differences of C due to differences in R of only one foot are 0·029, 0·026, and 0·025; while the lateral differences at the point of R=7, corresponding to and between the three classes, are as much as 0·193 and 0·130, thus indicating a coarseness of classification that would utterly annul most of the advantages that should be derived from the use of the formula.

There hence seems no alternative but to add two intermediate classes for canals in earth, thus making five in all, which are— **The classification of canals in earth adopted in this book.**

FINAL CLASSES.

	N.
CLASS I.—Canals in very firm gravel, in perfect order and regimen	**0·020**
CLASS II.—Canals in earth, above the average in order and regimen	**0·0225**
CLASS III.—Canals in earth, in good fair working average order and regimen .	**0·0250**
CLASS IV.—Canals in earth, below the average in order and regimen	**0·0275**
CLASS V.—Canals in earth, in rather bad order, slightly damaged, and partially overgrown with weeds and obstructed by detritus	**0·0300**

These classes, too, are the more necessary in earthen canals, as the coefficient N is not merely one of simple roughness of material, but also of irregularity, sinuosity, and erosion, for which allowance must be made invariably. They have hence been adopted throughout this work, and coefficients of mean velocity are given in Table II. under these five classes, as well as under the three classes for artificial materials.

The extreme class adopted by Herr Kutter for channels in excessively bad order, overgrown with vegetation and blocked with detritus, where $N=0.035$, is evidently more suited to natural channels than to canals under civilised supervision, and seems to suffer from being limited to a rigid value of N; it hence does not require any special provision to be made for it in the form of lengthy tables of velocity and discharge. Coefficients of mean velocity suited to such cases may be calculated, however, with the aid of Table I.

The three middle classes, II., III., and IV., for earthwork being those of most frequent application in practice, velocities of discharge and quantities of discharge are given under these three heads in the Tables of Final Results; while, as Classes I. and V. are of less frequent occurrence, and as the extent of this work is limited, these are omitted entirely in those tables. Corresponding coefficients of mean velocity, however, may be rapidly obtained by using Table XII., and applied in the Tables of Final Results to the velocities and discharges there given for the other classes, after first dividing them by

the coefficients given with them; and thus velocities and discharges for cases in Classes I. and V. can be obtained without much calculation.

THE COEFFICIENTS OF VELOCITY.

Coefficients of mean velocity for large rivers, canals, and culverts.

SUCH coefficients of mean velocity of discharge as are applicable to large rivers are not given in this work, which practically limits its scope to the largest description of canal of irrigation 300 feet wide at the bottom, with a depth of water of 16 feet; although coefficients of mean velocity are given for values of R, the hydraulic radius up to 20 feet, and for hydraulic gradients down to 0·000 05. Coefficients corresponding to larger dimensions, generally requiring a closer determination of the value of N, may be calculated with the aid of the variables given in Table I.; while those necessary for practical application in all cases of canals and culverts are given in Table II., under the classification previously explained and mentioned again on pages 54 and 55. These are unavoidably given in accordance with values of R, the hydraulic radius, and S, the sine of the hydraulic slope, in round numbers; but these values are taken so close, that intermediate coefficients may be interpolated without difficulty. (See paragraph on methods of interpolation, pages 39 to 47.)

In the tables of Final Results again, the values of C are invariably given with every case; and though

these cases do not often have round numbers for values of R, yet they generally have round numbers for some dimension of the channel or culvert, so that these also admit of interpolation.

The construction of Table II.

It may be urged that it might have been better to have constructed Table II., the collection of coefficients of mean velocity of discharge both for culverts and canals, in accordance with values of $\sqrt{R}$ instead of R, as C is shown by the formula to vary more nearly with $\sqrt{R}$ than with R itself. It certainly would have been better for the calculator of these laborious tables, but not for those using them; for, in the first place, most people that require such tables are conversant with values of R, and are habituated to think in them, and not in values of $\sqrt{R}$; and, in the second place, the round numbers which would represent the values of $\sqrt{R}$ within the required limits are not sufficiently close to admit of convenient interpolation. Hence the labor saved by the calculator would be, in that case, thrown on those that use the table, an object which is the reverse of the intention of this work.

The limits to the values of R and S, and their effect on C.

The limits to the values of R and S, applied to the coefficients in Table II. and throughout the book, have been determined on practical considerations;—while the highest limit $R=16$ or $R=20$ is never exceeded in ordinary canals, the lowest limit $R=0{\cdot}10$ is frequently passed in small drains and pipes;—and no values are given for smaller dimensions for the reason that experiment has not yet sufficiently proved that the law of coefficients demonstrated in Kutter's formula holds good for smaller

values of R. We hence assume that the coefficients of mean velocity remain constant for all values of R less than 0·10, or remain substantially the same as they happen to be at that value of R. As regards the effect of the values of S on those of C, it will be observed that, in the first place, the values of C diminish with lower hydraulic inclinations when in combination with small values of R, while they increase with lower hydraulic inclinations when in combination with large values of R; the point of divergence being when R=3·2818 feet or 1 metre, or when $\sqrt{R}=1{\cdot}811$, as shown by the formula.

Again, with reference to the limiting values of S, it will be noticed, on working out the formula for a number of cases, that the values of C do not vary very much with values of S greater than 0·001, or one per thousand; and as Kutter assumes that they remain constant for such higher hydraulic gradients, and there seems no object to be gained at present by introducing any further refinement at this point, this limit has been adhered to in this book. The lowest limiting hydraulic gradient here adopted is 0·000 05, a fall of one in 20 000, or nearly 3 inches per mile; as, from experience on canals in the Madras Presidency, where the lowest gradient set out by the author was 4 inches per mile, all canals with a less hydraulic slope than the former may be generally treated as still-water canals, or their discharges may be calculated from a few observed maximum velocities in connection with the coefficient given for the limiting value of S here adopted.

For this, as well as similar purposes, Table V. has The application of

values of C in Table V.

been constructed; it gives mean velocities of discharge corresponding to coefficients of mean velocity and observed maximum velocities in open channels. The formula used to obtain this relation is that of Bazin, which, when reduced to English measures, is—

$$\frac{V_s}{V}=1+\frac{0{\cdot}25354}{C}$$

or, in another form,

$$V_s-V=25{\cdot}354\,.\,\sqrt{RS}.$$

while the coefficients are those of Kutter. This, perhaps, may not be considered perfectly satisfactory, though it is, in the opinion of the author, the nearest thing to the truth on an extended scale in this respect that hydraulic science now affords; and, moreover, if this principle be applied in the manner intended, it is probable that the adherent errors will not be large, except in extreme cases.

The consideration of coefficients of maximum velocity.

A consideration of the relation between maximum and mean velocities of discharge and their respective coefficients, certainly induces one to believe that too little consideration has hitherto been given by hydraulicians and experimentalists to the matter of maximum velocity in open channels; and to reflect that after all there may be some slight difference between a mean velocity as calculated from a number of observed velocities in a section and a mean velocity of discharge, which is strictly a term represented by the actual measured quantity of water discharged divided by the area of the water section. And, if such be the case, a great deal of discrepancy hitherto unsuspected may be accounted for. This seems more likely to be the case on remembering that the

set of velocities actually observed at any section must necessarily be incomplete to the extent of a whole lamina of a few inches covering the bed and banks where velocities cannot be observed at all. Our ignorance of the laws of sectional distribution of velocity in open channels also points to the same conclusion; for our information is now limited to the laws of variation of velocity in a vertical plane, and then only to cases where the channel is an extremely flat rectangle; while the remarks of Bazin that in ordinary rectangles the influence of the lateral walls or banks shows itself in the middle of the current, and that no law of decrement of velocity seems possible, also force one to believe that as these velocities, when very near to bed or banks, can neither be observed nor calculated, our so-called mean velocities utterly fail in exactitude.

This possible error of hydraulicians does not, of course, extend to full cylindrical pipes, whose discharge can be practically and positively measured, and where the laws of sectional variation of velocity are well known; but only to open channels, and, more especially, to large ones, in which this influence is greater.

Of course it is either a fact that it is so, or that it is not so, whether the rigid mathematical theories on which our formulæ are based admit of it, or whether they do not (and the latter seems to be the case): for it is a matter for practical demonstration on a large scale, and can only be proved by turning the water from a river or large canal into some impervious measured basin or reservoir under very

favorable conditions, which is not perfectly impossible, it is true, but is yet very rarely possible.

Thus, as the actual discharge cannot often admit of direct check by practical methods, and as, under such a theory, the mean velocity of discharge, for the calculation of which hydraulicians have spent so much labor and devised so many formulæ, becomes a mere stepping-stone or formulated expression. It would appear that hydraulicians have been perpetually striving for a shadow that they cannot grasp, or, at any rate, can never make absolutely sure.

The practical check on formulæ for maximum velocity.

If, on the contrary, they had given the same amount of labor to devising a theoretical formula for maximum velocity, due to certain dimensions, gradients, and conditions of surface and regularity, these formulæ would admit of direct check by practical observations of maximum velocity; while the connection of maximum velocity with a formulated mean velocity, or with the discharge itself, might form a separate study. Had this method of procedure been hitherto adopted, as it may be in future, the coefficients of maximum velocity would have taken the place of coefficients of mean velocity in point of importance, and this work would have been filled with the former in place of the latter, an arrangement which now seems premature, and, in consequence, has not been yet adopted, although there can be but little doubt that in the abstract it would be the more rational plan.

The number of figures to which C may

Returning to the coefficients of mean velocity given in Table II., it will be noticed that when they

exceed unity they are given to five figures, and, when less, to four figures, so as to admit of reduction or interpolation with results correct to four and to three figures respectively. The immense range of these coefficients indicates that if they are correct in intermediate values to within 0·001, nothing more is to be desired; for these coefficients are mere aids to arriving at a correct mean velocity, the bulk of the value of which is dependent on that of the expression $100\sqrt{RS}$; while as long as the classification of canals into five classes is adhered to, extreme exactitude in the last figure of the reduced coefficients is perfectly needless. be used in practice.

DESCRIPTION OF THE TABLES.

The principal object of the Tables.

THE coefficients, both of rugosity and irregularity and of mean velocity, being thus dealt with and finally settled, with regard to their application, their limits, and their exactitude, the bulk of the Tables becomes the next point of interest. The object of the Tables being to afford a ready determination of mean velocities* and of discharges* due to various dimensions of section, conditions of surface and regularity, and hydraulic inclinations, in all ordinary cases of

* These are invariably given in feet and cubic feet per second respectively.

culverts and canals, and the converse of these results, the limits of these Tables are necessarily fixed both in accordance with the practical considerations dependent on the usual forms and conditions of canals and culverts, and also with regard to the limits assigned beforehand to the size and amount of matter contained in the book. With regard to the latter, it is, perhaps, unfortunate that these limits do not allow the introduction of tables of discharge for partly filled, as well as for full, culverts and pipes, which would have made them more useful to the drainage engineer; and, in the second place, that they do not permit the extension of the Tables of Final Results to the extreme classes, Classes I. and V. of canals in earth, nor to aqueducts and canals in brickwork and in cement: but these would have greatly added to the expense of the work, while they may be more conveniently dispensed with than any of the matter actually introduced.

Practical limits.

The conditions of canals and culverts impose limits which greatly reduce the apparently very comprehensive object of the Tables. In the first place, in canals in earth, a certain limiting maximum velocity is always adopted, beyond which erosion and damage would result; and the Tables are hence constructed to include cases a little beyond this limit. (For limiting velocities see page 126, Table V.) In culverts and drain pipes again, there are limiting minimum velocities, below which deposit of sediment would occur; and these velocities have been also taken into consideration.

Forms and dimensions of culverts.

The sizes and dimensions of both culverts and canals, and their forms of section, are also limited by custom or practice. Cylindrical culverts and pipes are now rarely made of large dimensions; they are universally used up to diameters of eighteen inches, and above that only in cases where they can be kept steadily well supplied, and never allowed to run very low, a condition that occurs infrequently with diameters exceeding five feet. Ovoidal sewers of various patterns are generally adopted for a series of regular sizes from 1′ 0″ × 1′ 6″ up to 6′ 0″ × 9′ 0″. The two types of ovoid most commonly used are Hawksley's and the Metropolitan pattern, originally, it is believed, designed by Phillips, both of which, as well as the following type, are circular-headed; but, as the tendency of engineers up till now has continually been to adopt forms of culverts which allow of higher flushing with the same amount of discharge, this principle has been carried to its extreme in the Pegtop form of section of the author, where the invert is made small to produce greater scour; and, the sides being straight, possess the advantage of preventing the lodgment of sediment on them. These three types of ovoid, as well as the cylinder, are adopted in the Tables as including all that is commonly necessary; their sectional data are given in Table IV. in all cases where they are either full, two-thirds full, that is, full to two-thirds of the total vertical depth, and one-third full. For any other special depths, which are not frequently wanted, the sectional data must be calculated; to assist in this a table of circular

arcs is given in Table XII., and examples of calculation are given at the end of the tables. Culverts and pipes are also generally considered to come under some one of three classes as regards size—the small, the intermediate, and the large; and though they certainly might be laid to any inclination, they practically are not, and the limits of inclination ordinarily adopted are adhered to in these Tables. As regards material, culverts and drain pipes are made in plain earthenware and glazed stoneware up to dimensions of 2′ 0″ by 3′ 0″, rarely above that; and brickwork and concrete, either plain or lined with cement, is used with larger dimensions. Iron of all sorts, and either plain, painted, or enamelled, may of course be used of any dimension, the adoption of wrought iron beginning where cast iron becomes inapplicable from the size of the casting or from its inconvenience in transport. This diversity of material does not cause much difficulty in the tables, as it has already been assumed that all materials that are glazed, enamelled, coated with smooth cement or with paint, come under one class; and that plain brickwork, ashlar, unglazed earthenware and stoneware, and plain cast and wrought iron, all fall into another class as regards roughness; but that when any of these are deteriorated by wear, without being very seriously damaged, they fall under the corresponding next lower class. This has been already explained in the paragraph on coefficients of roughness, and in the list of these coefficients on pages 54, 55.

Their materials.

The mean velocities and discharges of culverts and pipes, given in the Tables of Final Results, VI. and VII., being intended for the use of the engineer in works of drainage and sewerage, are not intended to apply to circumstances under which any head of pressure is habitually employed. The condition under which the quantities are correct is that the culvert or pipe just runs full-bore without heading-up, as it is termed.

Absence of head of pressure.

For pipes discharging under a steady head of pressure, apart from the head due to the hydraulic inclination of the pipe itself, another formula introducing the amount of that head should be used to calculate velocities and discharges, which will then be in excess of those given in these Tables.

With regard to canals in earth, the section invariably adopted in practice is a rather flat trapezoid, with side slopes varying with the nature of the soil from about $\frac{3}{4}$ to 1 to $2\frac{1}{2}$ to 1; a sufficiently wide range, in which the most useful side slope has to be chosen and adopted. It appears that $1\frac{1}{2}$ to 1 has been hitherto the favourite, and it certainly is a convenient mean; but the results of practical observation by the author on canals constructed with various side slopes has led him to believe that in most cases between $1\frac{1}{4}$ and $2\frac{1}{2}$ to one, the portion below water becomes altered by the action of the water, which erodes the foot of the slope, and by the sediment which is deposited on the upper part of it, until the side slope settles down to one to one, or very near it. And as it is this portion of the side slope, and not that above water level, which has to

Sections of canals in earth.

be taken into consideration in constructing tables of discharge, the side slope of one to one has been adopted in preference to others. In support of this choice may be mentioned that when some Indian canal engineers had some tables of discharge for small distributaries calculated for them some years ago, in accordance with the formula of Bazin, which had then arrived within their cognizance, they chose the same side slope as most useful to them.

Side slopes adopted.

In order, however, to avoid inconvenience to those who prefer calculating with other side slopes, a table of Reduction Multipliers, corresponding to trapezoids of various ordinary forms, is given in Table XII., in accordance with which reduced values of the velocities and discharges given in the Tables of Final Results may be obtained with little labour.

Limiting hydraulic slopes.

The inclinations of canals in earth are limited by the highest velocities they will bear, and these limits show themselves in the tables of velocity and discharge. The selection of widths of bed and depths of water has been made to suit canals of irrigation, from trenches upwards, and navigable canals, without including large ship canals, which usually consist of nearly still-water reaches of greater depth without any important velocities. They are also mostly arranged with the view of convenience in interpolation.

Aqueducts and canals in rubble.

Aqueducts and short portions of canal constructed in brickwork or rubble, plain or coated with cement, or excavated in rock, have generally either a rectangular section or a trapezoidal one with a slight batter to the sides. Their inclinations are rather

more rapid than those of the other portions of the same canal that are in earth; and this allows a reduction of section and of expense without affecting the amount of discharge, and without increasing the velocity to such an extent as to continue it into other reaches of the canal; their limiting gradients are hence in excess of those suited to canals in earth. For sections of this type, sectional data are also given in Table IV.; and velocities and discharges suited to constructions in rubble are given for them in Table VIII. of Final Results.*

Aqueducts and canals in brickwork, ashlar, or in cement, being constructions involving some expense, particular consideration is generally given to them, and their velocities and discharges can hence be specially calculated with the aid of the coefficients given in Table II., the values of the expression $100\sqrt{RS}$ given in Table III., and the sectional data given in Table IV.

Arrangement of the Tables. The Tables generally are divided into two parts; Part I. consisting of Computing Tables, by means of which independent calculations may be shortened, or partial calculations may be made; and Part II. consisting of Final Results, in which coefficients of mean velocity, mean velocities of discharge, and quantities discharged, are given together for a very large number of cases commonly occurring in canals and culverts. The use of the tables in Part I. has already been described while treating of the formula, and the coefficients of roughness and of mean velocity, with the exception of Table IV. (sectional

* The Reduction Multipliers in Table XII. also apply to them.

data), which has just been referred to, and requires no further explanation. With regard to the use of the tables in Part II., they are principally intended for reading off results at a glance, and for interpolation when that cannot be done. It will be noticed that they are so arranged for convenience in reading off velocities and discharges for certain given sectional data, conditions of channel or surface, and hydraulic slopes. For the converse process of obtaining either hydraulic slopes or sectional dimensions corresponding to given velocities and discharges under given conditions of channel or section, that is in any fixed class, they are equally applicable. It would hence have been wasteful to have constructed tables specially for the converse process, which admits of a large number of solutions for each case.

The title pages and headings of these tables, and the summary at the beginning, and the table of contents at the end of this book, speak for themselves, and make reference to them sufficiently easy without any description. Their use is best explained by examples, a few of which are given at the end of the book. Interpolation forming an important part in the use of these tables, the following paragraph on the subject is attached, and completes the explanatory matter, which, however redundant it may be to those who are thoroughly conversant with the matter therein treated, and could use the tables without it, will probably be of use to others.

METHODS OF INTERPOLATION.

AN examination of the Kutter formula renders it evident that tables of velocities and discharges for canals and culverts under various conditions that would give results on inspection for every possible case that could occur are simply an impossibility; the accompanying tables are, therefore, so constructed for round numbers that every possible case may fall within its range, and hence be easily obtained by interpolation. The following remarks on this subject may be of use to a great number of persons who may wish to interpolate correctly.

Necessity of correct principles of interpolation.

When a series of quantities increase or decrease by equal differences, or even by nearly equal differences, they may be correctly interpolated in the ordinary way by the addition of proportional parts of these differences. Table V. is an instance of this case. The differences, when taken laterally, are practically equal, any inequality being merely apparent, and due to the augmentation of the last figure. For example: Let the observed maximum velocity be 4·85 feet per second, and the co-efficient C applicable to the conditions and dimensions of the channel under consideration be 0·735; the corresponding mean velocity of discharge is required.

Ordinary interpolation by proportional parts.

Example for Table V.

Referring to page 120, Table V., for the nearest tabular quantities, which are—

C	4·75	Lateral diff.	5·	Lateral diff.	5·25
0·70	3·448	·183	3·671	·182	3·853
0·75	3·550	·187	3·737	·187	3·924
0·80	3·607	·190	3·797	·190	3·987

it is quite plain that the lateral differences can be divided proportionately without error; and that it is, therefore, better to begin with these. Doing so, the results are thus—

C	4·85	Vertical differences.
0·70	3·561	
		·064
0·75	3·625	
		·058
0·80	3·683	

Again, if the vertical differences are sufficiently nearly equal that the results of their inequality may be neglected, the difference ·064 can also be divided proportionately; so that the required mean velocity, when C=0·735, is—

$$=3{\cdot}651+\frac{35}{50}\cdot{\cdot}064=3{\cdot}561+{\cdot}045=3{\cdot}606 \text{ feet per second.}$$

or, for practical purposes, 3·61 feet per second.

Practical limits to the application of simple proportional parts.

Now, in such hydraulic calculations, we know that it is not possible to make sure of theoretical velocities being absolutely correct, even with the aid of the best formula, to within one per cent. of the truth; and that this is more especially the case with regard to small quantities and small fractions. Hence we are compelled to look on hundredths of a foot per second, when thus obtained, as mere formalities which may comparatively be neglected. In this case the neglect of the inequality of the vertical differences, and the mode adopted in interpolation, has not vitiated the result; for had any other vertical difference, lying between that adopted and the next lower ·058, been used instead of it, the result would not have varied by

more than ·004, or less than a hundredth of a foot per second.

In other cases, however, greater accuracy of interpolation may be advisable; and, though any mathematical dissertation is far from the aim of this work, a description of an accurate and rapid method of interpolation becomes necessary, more especially as many faulty modes are often adopted.

Accurate method applied to Table II.

Taking, for example, from page 64, Table II., the following quantities, which increase by decreasing differences,

R	C	Differences.
0·10	0·9380	
		1935
0·20	1·1315	
		1139
0·30	1·2454	
		795
0·40	1·3249	
		603
0·50	1·3852	

the value of C is required when R=0·325.

If simple proportional parts are used,

$$C=1{\cdot}2454+\frac{25}{100}\,.\,{\cdot}0795=1{\cdot}2454+{\cdot}0199=1{\cdot}2653\,;$$

while the true value of C, when calculated by the original formula, is 1·2676, and the error is 0·0023 in diminution.

By a more accurate method,

$$C=1{\cdot}2454+\frac{25}{100}\,.\,{\cdot}0795+\frac{25}{100}\times\left(-\frac{75}{100}\right)\times\frac{{\cdot}0603-{\cdot}1139}{4}$$

$$=1{\cdot}2454+{\cdot}0199+\frac{3}{4}\,.\,{\cdot}0034=1{\cdot}2678\,;$$

and this, showing an error in excess of only 0·0002, is sufficiently correct for almost all purposes, without further improvement.

Proof.

The additional term here introduced is mathematically correct, as the following proof will show.

Assuming the well known formula for the value of the n^{th} term of a series A, B, C, D, &c., when the first terms of the several orders of differences are denoted by a, a', a'', a''', &c.

$$n^{\text{th}} \text{ term} = A + na + \frac{n \, . \, \overline{n-1}}{1\,.\,2\,.}\,a' + \frac{n\,.\,\overline{n-1}\,.\,\overline{n-2}}{1\,.\,2\,.\,3}\,a'' + \text{\&c.}$$

	Series.	First differences.	Second differences.	Third differences.
p	A			
		a		
q	B		a'	
$(q+n)$	(x)	b		a''
r	C		b'	
		c		
s	D			

Let x be the required $\overline{n+1}^{\text{th}}$ term, to be interpolated between B and C, and n the fraction of the difference between q and r, corresponding to the point of interpolation, so that $q+n$ is the corresponding term in the series of equal differences, p, q, r, s, &c.

Now, by inspection of the above tabulated differences, it is evident that

$$A+a=B\,;\ a+a'=b\,;\ a'=\frac{b'+a'}{2}-\frac{a''}{2}\,;$$

$$a'=b-a\,;\ b'=c-b\,;\ \text{and}\ \frac{a'+b'}{2}=\frac{c-a}{2}\,;$$

$$\text{and} \therefore a'=\frac{c-a}{2}-\frac{a''}{2}\,;$$

The formula can then be thus reduced for the $\overline{n+1}^{\text{th}}$ term,

$$x = A + \overline{n+1}\,.\,a + \frac{\overline{n+1}\,.\,n}{1\,.\,2}\,a' + \frac{\overline{n+1}\,.\,n\,.\,\overline{n-1}}{1\,.\,2\,.\,3}\,a'' + \&c.$$

$$= B + nb + \frac{n\,.\,\overline{n-1}}{1\,.\,2}\,a' + \frac{\overline{n+1}\,.\,n\,.\,\overline{n-1}}{1\,.\,2\,.\,3}\,a'' + \&c.$$

$$= B + nb + \frac{n\,.\,\overline{n-1}}{1\,.\,2}\,.\,\frac{c-a}{2} + \frac{n\,.\,\overline{n-1}\,.\,\overline{2n-1}}{12}\,a'' + \&c.$$

And as in this process the value of the sum of the first three terms has been augmented, and that of the fourth term has been considerably diminished, this latter may be neglected. Hence

$$x = B + nb + n\,.\,\overline{n-1}\,.\,\frac{c-a}{4}.$$ Formula.

a brief and convenient formula, that can be practically applied with the use of a single column of first differences, as shown in the preceding example.

There is, unfortunately, a large number of people who cannot appreciate the convenience of formulæ, and for whom a written rule is more easy of comprehension. The rule will then be:—Take out the differences in the series at the point of required interpolation, the next higher and the next lower, and to the next lower term in the unequally increasing series add a proportional part of the difference between it and the next higher term, obtained in the usual manner, by multiplying the difference by the fraction of increment in the equally increasing series; and to the sum add the following term:—Take one-fourth of the difference between the next lower and the next higher differences, and multiply it both by the fraction before mentioned and by the difference between that fraction and unity. Rule.

Rough application of the factor.

This rule will hold good for all series of unequal increment, having decreasing first differences.

Returning to the formula. The application of the factor $n.\overline{n-1}$ in the last term is not so unwieldy as it may appear at first sight; and in cases where this term is required only roughly, the labour of its computation may be much reduced by remembering the following rough values of $n.\overline{n-1}$, corresponding to values of n, when the differences in the equally increasing series p, q, r, s, are either one or a fourth; and using the nearest of these for any intermediate values of n.

n.	—	$n.\overline{n-1}$
$\frac{50}{100}$	$\frac{12}{25}$	$\frac{1}{4}$
$\frac{40}{100}$ or $\frac{60}{100}$	$\frac{10}{25}$ or $\frac{15}{25}$	nearly $\frac{1}{4}$
$\frac{30}{100}$ or $\frac{70}{100}$	- - -	$\frac{1}{5}$
$\frac{25}{100}$ or $\frac{75}{100}$	- - -	nearly $\frac{1}{5}$
$\frac{20}{100}$ or $\frac{80}{100}$	$\frac{5}{25}$ or $\frac{20}{25}$	$\frac{15}{100}$
$\frac{10}{100}$ or $\frac{90}{100}$	- - -	$\frac{1}{10}$
$\frac{5}{100}$ or $\frac{95}{100}$	- - -	$\frac{1}{20}$
$\frac{4}{100}$ or $\frac{96}{100}$	$\frac{1}{25}$ or $\frac{24}{25}$	$\frac{1}{25}$

The factor $n.\overline{n-1}$ is necessarily negative, as n is always less than 1; but as with decreasing first differences $c-a$ is also negative, the sign may be neglected, as the term remains positive. The method based on this formula is hence particularly well suited to the interpolation of coefficients of mean

velocity, and series similar to them. The author may be pardoned for defending his formula (by mathematical demonstration) beforehand, on its being remembered that it is generally too late to do so afterwards, when the gossip of the ignorant and the thoughtless may have already done mischief in the dark, or the infallible criticism of some newspaper its damage in the broad daylight, without possibility of recantation or opportunity for reply. (For one such instance, may be mentioned a critique on the Hydraulic Manual, in which the formulæ on resistance to towage were declared incorrect, simply because the muddling critic appears to have imagined that resistance and horse-power were identical.)

In cases where still greater accuracy of interpolation is required, it is advisable to work out a few conveniently spaced intermediate values by means of the original formula of the series, to introduce them in the series, and to interpolate by means of the smaller differences thus resulting in the method described.

Practical limit of error to interpolated values of C, obtained from Table II.

In the special case of interpolation of the coefficients of mean velocity given in Table II., it will be noticed that the values of C are generally sufficiently close to admit of the use of simple proportional parts; for they are given to five figures when exceeding unity, and to four figures when less; whereas any values required in actual practice, or for practical purposes, would be used to one figure less in each case. This will be apparent on remembering that the values of C are dependent on those of N, the coefficient of roughness and irre-

gularity, to so important an extent, and that the limits of the values of N are so vague and ill-defined in dealing with theoretical conditions, that any attempt at extreme exactitude in calculating theoretical values of C would be very unwise.

In some parts, however, of Table II. the differences of the values of C are large, as in the example recently given for R=0·325 when N=0·010; and in such a case interpolation by the more correct method might be advisable. For while the actual value of C is 1.268, the mode of simple proportional parts makes it 1·265; and though a slight change in the value of N would alter C to an amount with which this difference of 0·003 would be inconsiderable, yet a line must be drawn somewhere; and this may be considered approaching the verge, if we assume a difference of 0·005 to be a suitable limit of error not to be exceeded in coefficients of mean velocity generally.

Even this limit is not too wide, as the vast range of these coefficients, varying in Table II. from 2·289 to 0·281, shows it to be comparatively small; in fact, the magnitude of the variation of C, in combination with the uncertainty of defining exact values to N, and hence, also, the uncertainty of C, lead one almost to the conclusion that values of C are required only within limits of error of 0·01, in which case they need not be represented by more than three figures when exceeding unity, or by more than two figures when less. If this conclusion be strictly just, the interpolation of the coefficients of mean velocity given in Table II. would hardly even

require the arithmetical subdivision of their differences; for they might be mentally interpolated by inspection to so small a number of figures; and again, a far coarser mode of calculating the whole series of Final Results, velocities and discharges, given in Part II., would have sufficed, at least for the present, though the amount of accuracy actually applied in them is, perhaps, not much in excess of probable future requirements.

Interpolation in Tables of Final Results.

However this may be, and taking the Tables of Final Results as they are, the method of interpolation before described may be conveniently applied to them in many ways; as both the velocities and the discharges may be interpolated in accordance either with intermediate depths of water or intermediate hydraulic inclinations, or even with intermediate widths of bed. They may also be used for obtaining velocities and discharges from them corresponding to sections having other side-slopes than one to one, in accordance with the new values of R, the hydraulic radius, and C the coefficient dependent on it, by means of the Reduction Multipliers in Table XII.; the use of which is explained in the Examples at the end of the book.

The labour of fresh calculations from the original formula in almost all cases of Canals and Culverts will thus be entirely saved.

TABLE I.

FORMULA, SYMBOLS, AND DISTINCTIVE TYPE,

LOCAL AND GENERAL VALUES OF N,

VALUES OF THE VARIABLES M, $\frac{M}{N}$, AND $\frac{1{\cdot}811}{N}$.

TABLE I.

FORMULA AND SYMBOLS.

$$Q=\left\{\frac{\frac{1\cdot811}{N}+41\cdot6+\frac{0\cdot00281}{S}}{1+\left(41\cdot6+\frac{0\cdot00281}{S}\right)\frac{N}{\sqrt{R}}}\right\}A\sqrt{RS}$$

Where Q is the mean discharge in cubic feet per second,
A is the sectional area of water-way in square feet,
R is the hydraulic radius of the section in feet,
S is the sine of the hydraulic slope of the water surface,
N is the coefficient of roughness and irregularity.

This may be modified into the convenient form,

$$Q=\frac{\sqrt{R}}{N}\left(\frac{M+1\cdot811}{M+\sqrt{R}}\right).A\sqrt{RS},$$

Where M is a variable dependent on S and N alone,

$$\text{and } M=N\left(41\cdot6+\frac{0\cdot00281}{S}\right)$$

Or may be further modified into the form,

$$Q=CA\,.\,100\sqrt{RS},$$

Where C is the coefficient of mean velocity,

$$\text{and } C=\frac{\sqrt{R}}{100N}\left(\frac{M+1\cdot811}{M+\sqrt{R}}\right),$$

Or, into its most simple form, Q=AV,

Where V is the mean velocity of discharge in feet per second,

$$\text{and } V=C\,.\,100\sqrt{RS}.$$

TABLE I.

TYPE USED IN THE TABLES.

The values of N, the coefficient of roughness and irregularity, are invariably given in thick type, thus,

0·0225.

So also are maximum velocities, which occur in Table V. only.

The values of C, the coefficient of mean velocity, are invariably given in antique type, thus,

1·428.

The values of V and of Q are always given in ordinary type, thus,

1·707, 10·43 ;

And in the Triplet Tables, Nos. VI. to XI., which give values of V, Q, and C grouped together, the mean velocity V is always the first of the three in the group, the quantity discharged Q is always second, and the coefficient C is third, thus,

$$\begin{matrix} V \\ Q \\ C \end{matrix} \begin{cases} 1{\cdot}707 \\ 10{\cdot}43 \\ 0{\cdot}548 \end{cases}$$

In all other cases ordinary type is used.

NOTE.

The values of S, the sine of the hydraulic slope, are more generally expressed for conciseness in the form of S per thousand in the Tables, thus, S per thousand=0·4 instead of S=0·0004; and S per thousand=20, instead of S=0·02.

TABLE I.

Local Values of the Coefficient N of Roughness and Irregularity.

Natural Channels.

0·0200	Bayou Lafourche.	Generally free from obstruction.
0·0210	Ohio, Point Pleasant.	
0·0220	Lech.*	
0·0227	Rhine at Germersheim.*	
0·0228	Tiber at Rome.	
0·0232	Weser.	
0·0237	Hübengraben.	
0·0243	Hockenbach.	
0·0243	Rhine in Holland.	
0·0250	Seine at Paris.	
0·0252	Newka.	
0·0260	Speyerbach.	
0·0260	Seine at Poissy.	
0·0260	Haine.	
0·0260	Rhine at Speyer.*	
0·0262	Newa.	
0·0270	Mississippi.	
0·0270	Saalach.*	
0·0270	Plessur.*	
0·0260	Saone at Raconnay.	
0·0280	Salzach.*	
0·0285	Elbe.	
0·0294	Bayou Plaquemine.	
0·0300	Rhine at Basle.*	Obstructed by detritus.
0·0305	Isaar.*	
0·0310	Meuse at Misox.*	
0·0310	Rhine at Rhinewald.*	
0·0345	Simme at Lenk.*	
0·0350	Rhine at Domleschgerthal.*	

* Obstructed by detritus.

TABLE I.

Local Values of the Coefficient N of Roughness and Irregularity.

Artificial Channels.

In Cement.

0·0100	Series No. 24 of D'Arcy and Bazin, semicircular.
0·0104	Series No. 2 of D'Arcy and Bazin, rectangular.
0·0111	Series No. 25, D. & B., with one-third sand, semicircular.

In Ashlar and Brickwork.

0·0129	Series No. 3, D'Arcy and Bazin, brickwork, rectangular.
0·0129	Series No. 39, D'Arcy and Bazin, ashlar, rectangular.
0·0133	Series Nos. 1 & 2, D'Arcy and Bazin, ashlar, rectangular.

In Rubble.

0·0145	Gontenbachschale, new, dry, semicircular.
0·0167	Series No. 32, D. & B., rather damaged, rectangular.
0·0170	Series No. 33, D. & B., rather damaged, rectangular.
0·0175	Grunnbachschale, damaged, dry, semicircular.
0·0185	Gerbebachschale, damaged, dry, semicircular.
0·0180	Series No. 1·4, D'Arcy and Bazin, rough.
0·0182	Series No. 1·3, D'Arcy and Bazin, rough.
0·0184	Series No. 1·6, D'Arcy and Bazin, rough.
0·0192	Series No. 1·5, D'Arcy and Bazin, rough.
0·0204	Series No. 44, D'Arcy and Bazin, with deposits, rectangular.
0·0210	Series No. 46, D'Arcy and Bazin, with deposits, rectangular.
0·0220	Series No. 35., D'Arcy and Bazin, damaged, trapezoidal.
0·0230	Alpbachschale, much damaged, semicircular.

In Rammed Gravel.

0·0163	Series No. 27, D'Arcy and Bazin, $\frac{3}{4}$-inch thick, semicircular.
0·0170	Series No. 4, D'Arcy and Bazin, $\frac{3}{4}$-inch thick, rectangular.
0·0190	Series No. 5, D'Arcy and Bazin, $1\frac{1}{2}$-inch thick, rectangular.

In Earth.

0·0184	A Canal in England.
0·0222	Linth Canal, trapezoidal.
0·0244	Marseilles Canal, rounded.
0·0254	Pannerden Canal, Holland.
0·0255	Jard Canal.
0·0262	Lauter Canal, Neuberg.
0·0300	Escher Canal (detritus).
0·0301	Marmels Canal.
0·0330	Chesapeake-Ohio Canal, rounded.

TABLE I.

THE GENERAL VALUES OF COEFFICIENTS (N) OF ROUGHNESS AND SURFACE; AS APPLIED BY THE AUTHOR IN THE FOLLOWING

AQUEDUCTS, CANALS, CUL-

0·010 Pure cement in England and Europe generally; also Indian
Glazed materials of every sort; glazed, coated, or enamelled

0·013 Brickwork and ashlar, in aqueducts, canals, and culverts.
Ordinary cast and wrought iron. Unglazed stoneware.
Materials mentioned under **0·010** when in bad order and

0·017 Rubble in cement, in good order.
Materials mentioned under **0·013** when in bad order and

0·020 Coarse rubble, set dry. Rubble in cement in bad condition.

CANALS IN NATURAL

0·020 Class I.—Very firm, regular gravel, carefully trimmed and

0·0225 Class II.—Earth. Canals and channels. (Based on various

0·0250 Class III.—Earth. Canals and channels. (Based on various

0·0275 Class IV.—Earth. Canals and channels. (Based on various

0·030 Class V.—Earth. Canals in bad order, rather damaged,

RIVERS

The local values of N, suitable to rivers and natural channels experimentally determined for other rivers, or may be deduced with other data and conditions. They vary between the limits

TEMPORARY

0·009 Well planed timber, in perfect order and alignment, and

0·012 Unplaned timber, when perfectly continuous on the inside.

0·015 Wooden frames covered with canvass.
Rectangular wooden troughs, with battens on the inside,

0·020 Rectangular wooden troughs, with battens on the inside,

TABLE I.

IRREGULARITY, FOR VARIOUS MATERIALS, AND CONDITIONS OF

TABLES, BASED ON THE FORMULA OF KUTTER.

VERTS, AND PIPES.

cement plaster, with worked surface.
stoneware and iron.

in good order.

condition.

condition.

Ruined brickwork and masonry.

UNWORKED MATERIAL.

punned in defective places; in perfect order.

data by the Author); above the average.

data by the Author); in good average order.

data by the Author); below the average.

slightly overgrown with weeds, or obstructed by detritus.

AND BROOKS.

generally, may be obtained by comparison with those already from a consideration of the observed maximum velocities in connexion of 0·020 and 0·035.

CONSTRUCTIONS.

perfectly straight; otherwise perhaps 0·010 would be suitable.

Flumes.

0·5 inch apart.

2 inches apart.

TABLE I.

VALUES OF M CORRESPONDING TO VALUES OF

S	N 0·010	0·011	0·012	0·013	0·014
0·00001	3·2260	3·5486	3·8712	4·1938	4·5164
02	1·8210	2·0031	2·1852	2·3673	2·5494
03	1·3527	1·4879	1·6232	1·7585	1·8938
04	1·1185	1·2303	1·3422	1·4540	1·5659
05	0·9780	1·0758	1·1736	1·2714	1·3692
06	0·8843	0·9727	1·0612	1·1496	1·2380
07	0·8174	0·8991	0·9809	1·0626	1·1444
08	0·7672	0·8439	0·9206	0·9974	1·0741
0·00009	0·7282	0·8010	0·8738	0·9467	1·0195
0·00010	0·6970	0·7667	0·8364	0·9061	0·9758
15	0·6033	0·6636	0·7240	0·7843	0·8446
20	0·5565	0·6121	0·6678	0·7234	0·7791
25	0·5284	0·5812	0·6341	0·6869	0·7398
30	0·5097	0·5606	0·6116	0·6626	0·7136
35	0·4963	0·5459	0·5956	0·6452	0·6948
40	0·4862	0·5348	0·5835	0·6321	0·6809
45	0·4784	0·5262	0·5741	0·6219	0·6698
0·00050	0·4722	0·5194	0·5666	0·6139	0·6611
0·00055	0·4671	0·5138	0·5605	0·6072	0·6539
60	0·4628	0·5090	0·5554	0·6016	0·6479
65	0·4592	0·5051	0·5510	0·5970	0·6429
70	0·4561	0·5017	0·5473	0·5929	0·6385
75	0·4535	0·4988	0·5442	0·5896	0·6349
80	0·4511	0·4962	0·5413	0·5864	0·6315
85	0·4491	0·4940	0·5389	0·5838	0·6287
90	0·4472	0·4919	0·5366	0·5813	0·6261
0·00095	0·4456	0·4901	0·5347	0·5793	0·6238
0·001	0·4441	0·4885	0·5329	0·5773	0·6217
0·0015	0·4347	0·4781	0·5216	0·5651	0·6086
0·002	0·4300	0·4730	0·5160	0·5590	0·6020
0·0025	0·4272	0·4699	0·5126	0·5554	0·5981
0·00281	0·4260	0·4686	0·5112	0·5538	0·5964
0·003	0·4254	0·4679	0·5105	0·5530	0·5956

TABLE I.

N AND S; WHERE $M=N\left(41{\cdot}6+\frac{0{\cdot}00281}{S}\right)$

S	N 0·015	0·016	0·017	0·018	0·019
0·00001	4·8390	5·1616	5·4842	5·8068	6·1294
02	2·7315	2·9136	3·0957	3·2778	3·4599
03	2·0290	2·1643	2·2996	2·4349	2·5702
04	1·6777	1·7896	1·9014	2·0133	2·1252
05	1·4670	1·5648	1·6626	1·7604	1·8582
06	1·3264	1·4148	1·5033	1·5917	1·6801
07	1·2261	1·3078	1·3896	1·4713	1·5530
08	1·1508	1·2275	1·3042	1·3810	1·4577
0·00009	1·0923	1·1651	1·2379	1·3108	1·3836
0·00010	1·0455	1·1152	1·1849	1·2546	1·3243
15	0·9049	0·9652	1·0256	1·0859	1·1462
20	0·8347	0·8904	0·9461	1·0017	1·0574
25	0·7926	0·8454	0·8983	0·9511	1·0039
30	0·7645	0·8155	0·8665	0·9175	0·9685
35	0·7444	0·7940	0·8437	0·8933	0·9429
40	0·7343	0·7829	0·8265	0·8753	0·9239
45	0·7176	0·7654	0·8133	0·8611	0·9089
0·00050	0·7083	0·7555	0·8027	0·8500	0·8972
0·00055	0·7006	0·7473	0·7941	0·8408	0·8875
60	0·6942	0·7405	0·7868	0·8330	0·8793
65	0·6888	0·7347	0·7806	0·8266	0·8725
70	0·6842	0·7298	0·7754	0·8210	0·8666
75	0·6802	0·7256	0·7709	0·8163	0·8617
80	0·6766	0·7217	0·7669	0·8120	0·8571
85	0·6737	0·7186	0·7635	0·8084	0·8533
90	0·6708	0·7155	0·7602	0·8050	0·8497
0·00095	0·6684	0·7130	0·7575	0·8021	0·8467
0·001	0·6661	0·7105	0·7550	0·7994	0·8438
0·0015	0·6520	0·6955	0·7390	0·7825	0·8260
0·002	0·6450	0·6880	0·7310	0·7740	0·8170
0·0025	0·6408	0·6835	0·7262	0·7690	0·8117
0·00281	0·6390	0·6816	0·7242	0·7668	0·8094
0·003	0·6381	0·6806	0·7232	0·7657	0·8082

TABLE I.

VALUES OF M CORRESPONDING TO VALUES OF

S	N 0·020	0·021	0·022	0·0225	0·023
0·00001	6·4520	6·7746	7·0972	7·2585	7·4198
02	3·6420	3·8241	4·0062	4·0972	4·1883
03	2·7054	2·8407	2·9759	3·0436	3·1112
04	2·2370	2·3489	2·4607	2·5166	2·5726
05	1·9560	2·0538	2·1516	2·2005	2·2494
06	1·7686	1·8570	1·9455	1·9897	2·0339
07	1·6348	1·7165	1·7983	1·8391	1·8800
08	1·5344	1·6112	1·6878	1·7262	1·7645
0·00009	1·4564	1·5293	1·6020	1·6384	1·6748
0·00010	1·3940	1·4637	1·5334	1·5682	1·6031
15	1·2066	1·2669	1·3273	1·3574	1·3876
20	1·1130	1·1687	1·2243	1·2521	1·2800
25	1·0568	1·1096	1·1625	1·1889	1·2153
30	1·0194	1·0704	1·1213	1·1468	1·1723
35	0·9926	1·0422	1·0919	1·1167	1·1415
40	0·9724	1·0213	1·0707	1·0940	1·1193
45	0·9568	1·0046	1·0523	1·0764	1·1001
0·00050	0·9444	0·9917	1·0388	1·0624	1·0860
0·00055	0·9342	0·9809	1·0276	1·0510	1·0743
60	0·9256	0·9718	1·0182	1·0413	1·0645
65	0·9184	0·9644	1·0102	1·0332	1·0561
70	0·9122	0·9579	1·0034	1·0262	1·0490
75	0·9070	0·9524	0·9977	1·0204	1·0431
80	0·9022	0·9473	0·9924	1·0150	1·0375
85	0·8982	0·9431	0·9880	1·0104	1·0329
90	0·8944	0·9392	0·9838	1·0062	1·0285
0·00095	0·8912	0·9358	0·9803	1·0026	1·0250
0·001	0·8882	0·9326	0·9770	0·9992	1·0214
0·0015	0·8694	0·9129	0·9563	0·9781	0·9998
0·002	0·8600	0·9030	0·9460	0·9675	0·9890
0·0025	0·8544	0·8972	0·9398	0·9612	0·9825
0·00281	0·8520	0·8946	0·9372	0·9585	0·9798
0·003	0·8508	0·8933	0·9359	0·9571	0·9784

TABLE I.

N AND S, WHERE $M=N\left(41\cdot6+\frac{0\cdot00281}{S}\right)$.

S	N 0·024	0·025	0·026	0·027	0·0275
0·00001	7·7424	8·0650	8·3876	8·7102	8·8715
02	4·3704	4·5525	4·7346	4·9197	5·0078
03	3·2464	3·3817	3·5170	3·6523	3·7199
04	2·6844	2·7962	2·9080	3·0199	3·0758
05	2·3472	2·4450	2·5428	2·6406	2·6895
06	2·1224	2·2107	2·2992	3·3876	2·4318
07	1·9618	2·0435	2·1252	2·2069	2·2478
08	1·8412	1·9180	1·9948	2·0715	2·1098
09	1·7476	1·8205	1·8934	1·9662	2·0025
0·00010	1·6728	1·7425	1·8122	1·8819	1·9168
15	1·4480	1·5082	1·5686	1·6289	1·6590
20	1·3356	1·3912	1·4468	1·5025	1·5303
25	1·2682	1·3210	1·3738	1·4266	1·4531
30	1·2232	1·2742	1·3252	1·3762	1·4016
35	1·1912	1·2407	1·2904	1·3400	1·3648
40	1·1670	1·2155	1·2642	1·3128	1·3371
45	1·1482	1·1960	1·2438	1·2916	1·3156
0·00050	1·1332	1·1805	1·2278	1·2750	1·2986
0·00055	1·1210	1·1678	1·2144	1·2611	1·2846
60	1·1108	1·1570	1·2032	1·2495	1·2727
65	1·1020	1·1480	1·1940	1·2399	1·2628
70	1·0946	1·1403	1·1860	1·2316	1·2543
75	1·0884	1·1337	1·1792	1·2246	1·2471
80	1·0826	1·1277	1·1728	1·2179	1·2405
85	1·0778	1·1228	1·1677	1·2126	1·2350
90	1·0732	1·1180	1·1626	1·2073	1·2298
0·00095	1·0694	1·1140	1·1586	1·2032	1·2254
0·001	1·0658	1·1102	1·1546	1·1990	1·2212
0·0015	1·0432	1·0867	1·1302	1·1737	1·1954
0·002	1·0320	1·0750	1·1180	1·1610	1·1825
0·0025	1·0252	1·0680	1·1108	1·1535	1·1748
0·00281	1·0224	1·0650	1·1076	1·1502	1·1715
0·003	1·0210	1·0635	1·1060	1·1485	1·1698

TABLE I.

VALUES OF M CORRESPONDING TO VALUES OF

S	N 0·028	0·029	0·030	0·031	0·032
0·00001	9·0328	9·3554	9·6780	10·000	10·323
02	5·0988	5·2809	5·4630	5·6451	5·8272
03	3·7876	3·9228	4·0581	4·1933	4·3286
04	3·1318	3·2436	3·3555	3·4673	3·5792
05	2·7384	2·8362	2·9340	3·0318	3·1296
06	2·4760	2·5644	2·6529	2·7412	2·8296
07	2·2888	2·3705	2·4522	2·5339	2·6156
08	2·1482	2·2249	2·3016	2·3783	2·4550
0·00009	2·0390	2·1118	2·1846	2·2574	2·3302
0·00010	1·9516	2·0213	2·0910	2·1607	2·2304
15	1·6892	1·7495	1·8099	1·8701	1·9304
20	1·5582	1·6138	1·6695	1·7251	1·7808
25	1·4796	1·5324	1·5852	1·6380	1·6908
30	1·4272	1·4781	1·5291	1·5800	1·6310
35	1·3896	1·4392	1·4889	1·5384	1·5880
40	1·3618	1·4102	1·4586	1·4822	1·5658
45	1·3396	1·3874	1·4352	1·4830	1·5308
0·00050	1·3222	1·3694	1·4166	1·4638	1·5110
0·00055	1·3078	1·3545	1·4013	1·4479	1·4946
60	1·2958	1·3421	1·3884	1·4347	1·4810
65	1·2858	1·3317	1·3776	1·4235	1·4694
70	1·2772	1·3228	1·3683	1·4141	1·4595
75	1·2694	1·3149	1·3605	1·4056	1·4512
80	1·2630	1·3081	1·3533	1·3983	1·4434
85	1·2574	1·3024	1·3473	1·3922	1·4371
90	1·2522	1·2969	1·3416	1·3863	1·4310
0·00095	1·2476	1·2922	1·3368	1·3814	1·4260
0·001	1·2434	1·2878	1·3323	1·3766	1·4210
0·0015	1·2172	1·2606	1·3041	1·3475	1·3910
0·002	1·2040	1·2470	1·2900	1·3380	1·3760
0·0025	1·1962	1·2389	1·2816	1·3243	1·3670
0·00281	1·1928	1·2354	1·2780	1·3206	1·3632
0·003	1·1912	1·2337	1·2762	1·3186	1·3612

TABLE I.

N and S, where $M=N\left(41 \cdot 6+\frac{0 \cdot 00281}{S}\right)$.

S	N 0·033	0·034	0·035	0·0375	0·040
0·00001	10·625	10·968	11·291	12·098	12·904
02	6·0093	6·1914	6·3735	6·8288	7·2840
03	4·4637	4·5992	4·7344	5·0726	5·4108
04	3·6909	3·8028	3·9147	4·1943	4·4740
05	3·2274	3·3252	3·4230	3·6677	3·9120
06	2·9181	3·0066	3·0950	3·3161	3·5372
07	2·6973	2·7792	2·8609	3·0653	3·2696
08	2·5317	2·6084	2·6852	2·8770	3·0688
0·00009	2·4030	2·4758	2·5487	2·7228	2·9128
0·00010	2·3001	2·3698	2·4395	2·6138	2·7880
15	1·9908	2·0512	2·1115	2·2623	2·4132
20	1·8363	1·8922	1·9477	2·0868	2·2260
25	1·7436	1·7966	1·8494	1·9815	2·1136
30	1·6818	1·7330	1·7839	1·9113	2·0388
35	1·6377	1·6874	1·7370	1·8611	1·9852
40	1·6059	1·6532	1·7017	1·8233	1·9468
45	1·5783	1·6266	1·6744	1·7940	1·9136
0·00050	1·5582	1·6054	1·6527	1·7708	1·8888
0·00055	1·5414	1·5882	1·6349	1·7517	1·8684
60	1·5273	1·5736	1·6198	1·7355	1·8512
65	1·5153	1·5612	1·6072	1·7220	1·8368
70	1·5051	1·5507	1·5964	1·7105	1·8244
75	1·4964	1·5418	1·5872	1·7006	1·8140
80	1·4886	1·5338	1·5788	1·6916	1·8044
85	1·4820	1·5269	1·5719	1·6875	1·7964
90	1·4757	1·5204	1·5652	1·6770	1·7888
0·00095	1·4703	1·5150	1·5596	1·6710	1·7824
0·001	1·4655	1·5100	1·5543	1·6653	1·7764
0·0015	1·4343	1·4780	1·5214	1·6301	1·7388
0·002	1·4190	1·4620	1·5050	1·6125	1·7200
0·0025	1·4097	1·4524	1·4952	1·6020	1·7088
0·00281	1·4058	1·4484	1·4910	1·5975	1·7040
0·003	1·4037	1·4464	1·4889	1·5953	1·7016

TABLE I.

VALUES OF $\frac{1\cdot811}{N}$ AND $\frac{M}{N}$ FOR COMPUTING C.

N	$\frac{1\cdot811}{N}$	S	$\frac{M}{N}$
0·010	181·10	0·00001	322·60
0·011	164·64	0·00002	182·10
0·012	150·92	0·00003	135·27
0·013	139·31	0·00004	111·85
0·014	129·36	0·00005	97·80
0·015	120·73	0·00006	88·43
0·016	113·19	0·00007	81·74
0·017	106·47	0·00008	76·72
0·018	100·61	0·00009	72·82
0·019	95·32		
0·020	90·55	0·0001	69·70
		0·00015	60·33
0·021	86·23	0·0002	55·65
0·022	82·32	0·00025	52·84
0·0225	80·49	0·0003	50·97
0·023	78·74	0·00035	49·63
0·024	75·46	0·0004	48·62
0·0250	72·44	0·00045	47·84
0·026	69·65	0·0005	47·22
0·027	67·07		
0·0275	65·85	0·00055	46·71
0·028	64·68	0·0006	46·28
0·029	62·45	0·00065	45·92
0·030	60·37	0·0007	45·61
		0·00075	45·35
0·031	58·42	0·0008	45·11
0·032	56·59	0·00085	44·91
0·033	54·88	0·0009	44·72
0·034	53·26	0·00095	44·56
0·035	51·74	0·001 and upwards	44·41
0·0375	48·29		
0·040	45·27		

N.B.—The coefficients (C) will remain practically constant for steeper hydraulic slopes.

TABLE II.

Coefficients (C) of Mean Velocity, as used in the General Formulæ,

$$Q = A \,.\, C \,.\, 100\sqrt{RS}\,,$$

$$V = C \,.\, 100\sqrt{RS}\,.$$

$$\text{where } C = \frac{\sqrt{R}}{100\,N} \cdot \frac{(M + 1{\cdot}811)}{(M + \sqrt{R})}\,.$$

TABLE II.

COEFFICIENTS (C) OF MEAN VELOCITY

Corresponding to Values of R and S per thousand,

N=0·010.

R	S per thousand. 1·0 and upwards.	0·8	0·6	0·5	0·4
0·10	0·9380	0·9323	0·9230	0·9158	0·9053
0·15	1·0505	1·0450	1·0359	1·0288	1·0185
0·20	1·1315	1·1262	1·1174	1·1106	1·1006
0·25	1·1943	1·1892	1·1808	1·1742	1·1647
0·3	1·2454	1·2405	1·2325	1·2262	1·2170
0·35	1·2882	1·2835	1·2758	1·2697	1·2609
0·4	1·3249	1·3204	1·3131	1·3073	1·2988
0·45	1·3569	1·3526	1·3455	1·3400	1·3319
0·5	1·3852	1·3811	1·3743	1·3690	1·3612
0·55	1·4105	1·4066	1·4001	1·3950	1·3876
0·6	1·4333	1·4296	1·4234	1·4186	1·4113
0·65	1·4541	1·4505	1·4446	1·4399	1·4330
0·7	1·4732	1·4698	1·4641	1·4596	1·4530
0·75	1·4907	1·4874	1·4819	1·4776	1·4713
0·8	1·5069	1·5037	1·4985	1·4943	1·4882
0·9	1·5360	1·5331	1·5282	1·5244	1·5188
1·0	1·5616	1·5589	1·5544	1·5509	1·5457
1·1	1·5843	1·5818	1·5777	1·5744	1·5696
1·2	1·6046	1·6023	1·5985	1·5955	1·5911
1·25	1·6140	1·6118	1·6082	1·6053	1·6010
1·3	1·6229	1·6208	1·6173	1·6145	1·6104
1·4	1·6397	1·6378	1·6345	1·6319	1·6282
1·5	1·6550	1·6533	1·6503	1·6479	1·6444
1·6	1·6691	1·6675	1·6647	1·6626	1·6594
1·7	1·6822	1·6807	1·6782	1·6762	1·6733
1·8	1·6943	1·6929	1·6907	1·6889	1·6862
1·9	1·7056	1·7043	1·7023	1·7006	1·6982
2·0	1·7162	1·7150	1·7132	1·7117	1·7095
2·1	1·7261	1·7251	1·7234	1·7221	1·7201
2·2	1·7355	1·7346	1·7331	1·7319	1·7301
2·3	1·7443	1·7435	1·7421	1·7411	1·7395
2·4	1·7527	1·7520	1·7508	1·7498	1·7485
2·5	1·7606	1·7600	1·7590	1·7582	1·7570

TABLE II.

for Cement and Glazed Material (New),

suited to Culverts and Pipes.

N=0·010.

R	S per thousand. 0·3	0·2	0·15	0·10	0·05
0·10	0·8886	0·8579	0·8303	0·7828	0·6815
0·15	1·0020	0·9715	0·9439	0·8958	0·7912
0·20	1·0846	1·0549	1·0279	0·9803	0·8752
0·25	1·1492	1·1204	1·0941	1·0476	0·9435
0·30	1·2021	1·1740	1·1489	1·1036	1·0012
0·35	1·2467	1·2200	1·1953	1·1514	1·0512
0·40	1·2851	1·2594	1·2357	1·1932	1·0951
0·45	1·3187	1·2940	1·2711	1·2300	1·1347
0·5	1·3486	1·3248	1·3028	1·2630	1·1703
0·55	1·3754	1·3526	1·3318	1·2929	1·2028
0·6	1·3997	1·3777	1·3572	1·3202	1·2327
0·65	1·4218	1·4007	1·3810	1·3451	1·2603
0·7	1·4422	1·4219	1·4028	1·3682	1·2859
0·75	1·4609	1·4413	1·4230	1·3896	1·3098
0·8	1·4783	1·4595	1·4418	1·4096	1·3323
0·9	1·5096	1·4922	1·4758	1·4458	1·3733
1·0	1·5372	1·5210	1·5058	1·4779	1·4100
1·1	1·5617	1·5468	1·5327	1·5067	1·4432
1·2	1·5838	1·5700	1·5569	1·5328	1·4735
1·25	1·5940	1·5807	1·5682	1·5449	1·4877
1·3	1·6037	1·5909	1·5789	1·5565	1·5013
1·4	1·6220	1·6102	1·5990	1·5783	1·5269
1·5	1·6388	1·6279	1·6176	1·5984	1·5507
1·6	1·6542	1·6442	1·6347	1·6170	1·5729
1·7	1·6685	1·6593	1·6506	1·6344	1·5937
1·8	1·6818	1·6734	1·6654	1·6506	1·6131
1·9	1·6942	1·6866	1·6793	1·6657	1·6315
2·0	1·7059	1·6990	1·6924	1·6800	1·6488
2·1	1·7169	1·7106	1·7047	1·6935	1·6652
2·2	1·7272	1·7216	1·7163	1·7062	1·6808
2·3	1·7369	1·7319	1·7272	1·7183	1·6956
2·4	1·7462	1·7419	1·7376	1·7298	1·7097
2·5	1·7550	1·7512	1·7475	1·7407	1·7232

TABLE II.

COEFFICIENTS (C) OF MEAN VELOCITY

Corresponding to Values of R and

N=0·010.

R	S per thousand. 1·0 and upwards.	0·8	0·6	0·5	0·4
1·75	1·6883	1·6869	1·6845	1·6826	1·6798
2·	1·7162	1·7150	1·7132	1·7117	1·7095
2·25	1·7400	1·7391	1·7377	1·7365	1·7349
2·5	1·7606	1·7600	1·7590	1·7582	1·7570
2·75	1·7788	1·7783	1·7777	1·7772	1·7764
3·	1·7948	1·7946	1·7943	1·7940	1·7937
3·25	1·8094	1·8094	1·8093	1·8092	1·8092
3·5	1·8225	1·8227	1·8229	1·8230	1·8234
3·75	1·8344	1·8346	1·8351	1·8354	1·8361
4·	1·8453	1·8458	1·8465	1·8471	1·8480
4·25	1·8554	1·8560	1·8570	1·8577	1·8589
4·5	1·8647	1·8654	1·8666	1·8674	1·8688
4·75	1·8734	1·8741	1·8755	1·8765	1·8781
5·	1·8814	1·8823	1·8839	1·8851	1·8869
5·25	1·8890	1·8900	1·8917	1·8930	1·8950
5·5	1·8961	1·8971	1·8990	1·9004	1·9027
5·75	1·9027	1·9039	1·9060	1·9075	1·9099
6·	1·9090	1·9103	1·9125	1·9142	1·9167
6·5	1·9206	1·9220	1·9245	1·9264	1·9293
7·	1·9309	1·9326	1·9352	1·9374	1·9406
7·5	1·9404	1·9422	1·9451	1·9474	1·9509
8·	1·9491	1·9510	1·9541	1·9566	1·9603
8·5	1·9570	1·9590	1·9623	1·9649	1·9688
9·	1·9643	1·9664	1·9699	1·9727	1·9768
9·5	1·9711	1·9733	1·9770	1·9799	1·9842
10	1·9774	1·9797	1·9836	1·9866	1·9911
11	1·9888	1·9913	1·9954	1·9987	2·0035
12	1·9988	2·0015	2·0058	2·0093	2·0145
13	2·0078	2·0105	2·0151	2·0188	2·0242
14	2·0158	2·0187	2·0235	2·0273	2·0330
15	2·0231	2·0262	2·0311	2·0351	2·0410
16	2·0297	2·0328	2·0380	2·0421	2·0482
20	2·0514	2·0548	2·0606	2·0652	2·0720

TABLE II.

FOR CEMENT AND GLAZED MATERIAL (NEW),

S per thousand, suited to Aqueducts.

N=0·010.

R	S per thousand. 0·3	0·2	0·15	0·10	0·05
1·75	1·6752	1·6664	1·6581	1·6425	1·6035
2·	1·7059	1·6990	1·6924	1·6800	1·6488
2·25	1·7321	1·7268	1·7218	1·7123	1·6883
2·5	1·7550	1·7512	1·7475	1·7407	1·7232
2·75	1·7751	1·7726	1·7703	1·7657	1·7544
3·	1·7930	1·7918	1·7906	1·7883	1·7825
3·25	1·8092	1·8091	1·8089	1·8087	1·8081
3·5	1·8238	1·8247	1·8256	1·8273	1·8316
3·75	1·8371	1·8389	1·8408	1·8442	1·8531
4·	1·8494	1·8521	1·8548	1·8598	1·8731
4·25	1·8606	1·8643	1·8677	1·8743	1·8916
4·5	1·8711	1·8754	1·8797	1·8878	1·9089
4·75	1·8809	1·8858	1·8909	1·9003	1·9252
5·	1·8899	1·8957	1·9013	1·9120	1·9403
5·25	1·8984	1·9049	1·9111	1·9230	1·9547
5·5	1·9064	1·9136	1·9203	1·9334	1·9682
5·75	1·9139	1·9217	1·9290	1·9432	1·9810
6·	1·9210	1·9292	1·9372	1·9524	1·9932
6·5	1·9341	1·9433	1·9523	1·9696	2·0158
7·	1·9458	1·9560	1·9660	1·9850	2·0363
7·5	1·9566	1·9677	1·9785	1·9992	2·0551
8·	1·9664	1·9783	1·9899	2·0122	2·0724
8·5	1·9754	1·9880	2·0003	2·0241	2·0884
9·	1·9837	1·9970	2·0101	2·0352	2·1033
9·5	1·9914	2·0054	2·0191	2·0455	2·1172
10	1·9986	2·0132	2·0275	2·0550	2·1302
11	2·0116	2·0273	2·0427	2·0725	2·1539
12	2·0230	2·0398	2·0562	2·0879	2·1750
13	2·0332	2·0509	2·0682	2·1017	2·1939
14	2·0424	2·0609	2·0791	2·1141	2·2110
15	2·0508	2·0701	2·0889	2·1255	2·2268
16	2·0584	2·0783	2·0979	2·1358	2·2411
20	2·0833	2·1055	2·1273	2·1698	2·2885

TABLE II.

Coefficients (C) of Mean Velocity for Brickwork and Ashlar

Corresponding to Values of R and S per thousand,

N=0·013.

R	S per thousand. 1·0 and upwards.	0·8	0·6	0·5	0·4
0·10	0·6502	0·6461	0·6394	0·6342	0·6267
0·15	0·7377	0·7335	0·7269	0·7216	0·7140
0·20	0·8020	0·7979	0·7914	0·7862	0·7787
0·25	0·8527	0·8488	0·8424	0·8373	0·8300
0·3	0·8945	0·8907	0·8845	0·8795	0·8725
0·35	0·9299	0·9264	0·9202	0·9154	0·9086
0·4	0·9605	0·9570	0·9512	0·9466	0·9400
0·45	0·9874	0·9840	0·9784	0·9740	0·9676
0·5	1·0114	1·0082	1·0028	0·9985	0·9924
0·55	1·0328	1·0299	1·0247	1·0206	1·0146
0·6	1·0527	1·0496	1·0446	1·0406	1·0348
0·65	1·0706	1·0677	1·0628	1·0589	1·0534
0·7	1·0871	1·0843	1·0797	1·0759	1·0706
0·75	1·1024	1·0996	1·0952	1·0915	1·0863
0·8	1·1166	1·1139	1·1096	1·1061	1·1011
0·9	1·1421	1·1397	1·1357	1·1325	1·1278
1·0	1·1648	1·1625	1·1588	1·1558	1·1515
1·1	1·1850	1·1829	1·1793	1·1765	1·1726
1·2	1·2032	1·2012	1·1980	1·1954	1·1917
1·25	1·2116	1·2096	1·2066	1·2041	1·2006
1·3	1·2196	1·2178	1·2149	1·2125	1·2090
1·4	1·2348	1·2331	1·2304	1·2281	1·2249
1·5	1·2487	1·2471	1·2446	1·2425	1·2395
1·6	1·2615	1·2601	1·2577	1·2558	1·2531
1·7	1·2734	1·2721	1·2700	1·2682	1·2657
1·8	1·2845	1·2833	1·2814	1·2798	1·2775
1·9	1·2949	1·2938	1·2920	1·2905	1·2884
2·0	1·3046	1·3037	1·3020	1·3007	1·2988
2·1	1·3138	1·3129	1·3115	1·3103	1·3086
2·2	1·3225	1·3217	1·3204	1·3193	1·3178
2·3	1·3307	1·3299	1·3288	1·3277	1·3264
2·4	1·3384	1·3378	1·3368	1·3359	1·3347
2·5	1·3458	1·3453	1·3444	1·3436	1·3426

TABLE II.

(New), Cast and Wrought Iron, and Unglazed Stoneware, suited to Culverts and Pipes.

N=0·013.

R	S per thousand. 0·3	0·2	0·15	0·10	0·05
0·10	0·6148	0·5930	0·5737	0·5407	0·4723
0·15	0·7019	0·6798	0·6600	0·6259	0·5536
0·20	0·7668	0·7448	0·7250	0·6907	0·6170
0·25	0·8183	0·7968	0·7772	0·7432	0·6693
0·30	0·8611	0·8401	0·8209	0·7875	0·7139
0·35	0·8976	0·8771	0·8584	0·8256	0·7530
0·40	0·9293	0·9095	0·8913	0·8592	0·7877
0·45	0·9573	0·9381	0·9204	0·8891	0·8190
0·50	0·9823	0·9637	0·9465	0·9161	0·8474
0·55	1·0050	0·9869	0·9703	0·9407	0·8731
0·60	1·0255	1·0081	0·9920	0·9633	0·8977
0·65	1·0444	1·0276	1·0120	0·9841	0·9201
0·70	1·0619	1·0456	1·0305	1·0034	0·9411
0·75	1·0780	1·0623	1·0476	1·0214	0·9607
0·8	1·0931	1·0779	1·0637	1·0383	0·9792
0·9	1·1203	1·1061	1·0929	1·0690	1·0132
1·0	1·1445	1·1313	1·1189	1·0965	1·0439
1·1	1·1661	1·1540	1·1422	1·1213	1·0718
1·2	1·1857	1·1742	1·1634	1·1439	1·0974
1·25	1·1948	1·1837	1·1733	1·1545	1·1095
1·3	1·2034	1·1928	1·1828	1·1646	1·1210
1·4	1·2198	1·2099	1·2006	1·1837	1·1430
1·5	1·2348	1·2257	1·2171	1·2014	1·1634
1·6	1·2487	1·2403	1·2323	1·2178	1·1825
1·7	1·2617	1·2539	1·2465	1·2332	1·2005
1·8	1·2737	1·2667	1·2599	1·2476	1·2174
1·9	1·2851	1·2786	1·2724	1·2611	1·2334
2·0	1·2957	1·2898	1·2842	1·2739	1·2486
2·1	1·3058	1·3005	1·2954	1·2860	1·2630
2·2	1·3153	1·3105	1·3059	1·2975	1·2767
2·3	1·3242	1·3200	1·3159	1·3084	1·2898
2·4	1·3328	1·3290	1·3254	1·3188	1·3023
2·5	1·3409	1·3376	1·3345	1·3287	1·3143

TABLE II.

COEFFICIENTS (C) OF MEAN VELOCITY FOR BRICKWORK

Corresponding to Values of R and

N=·013.

R	1·0 and upwards.	0·8	0·6	0·5	0·4
	S per thousand.				
1·75	1·2790	1·2778	1·2758	1·2742	1·2718
2·	1·3046	1·3037	1·3020	1·3007	1·2988
2·25	1·3266	1·3259	1·3246	1·3236	1·3222
2·5	1·3458	1·3453	1·3444	1·3436	1·3426
2·75	1·3628	1·3625	1·3618	1·3612	1·3606
3·	1·3779	1·3778	1·3775	1·3772	1·3769
3·25	1·3916	1·3916	1·3916	1·3916	1·3915
3·5	1·4040	1·4042	1·4044	1·4044	1·4048
3·75	1·4153	1·4155	1·4159	1·4161	1·4168
4·	1·4257	1·4261	1·4268	1·4272	1·4280
4·25	1·4353	1·4359	1·4368	1·4374	1·4384
4·5	1·4442	1·4448	1·4459	1·4467	1·4478
4·75	1·4525	1·4532	1·4544	1·4553	1·4567
5·	1·4602	1·4611	1·4625	1·4635	1·4651
5·25	1·4675	1·4684	1·4700	1·4711	1·4729
5·5	1·4743	1·4753	1·4771	1·4783	1·4803
5·75	1·4807	1·4819	1·4838	1·4851	1·4873
6·	1·4868	1·4880	1·4900	1·4915	1·4938
6·5	1·4980	1·4994	1·5016	1·5033	1·5059
7·	1·5081	1·5096	1·5120	1·5140	1·5169
7·5	1·5173	1·5190	1·5216	1·5238	1·5269
8·	1·5258	1·5275	1·5304	1·5327	1·5360
8·5	1·5335	1·5354	1·5384	1·5408	1·5444
9·	1·5407	1·5427	1·5459	1·5484	1·5522
9·5	1·5474	1·5494	1·5528	1·5554	1·5595
10	1·5535	1·5557	1·5593	1·5620	1·5662
11	1·5648	1·5671	1·5710	1·5740	1·5785
12	1·5748	1·5772	1·5813	1·5845	1·5893
13	1·5836	1·5862	1·5905	1·5939	1·5990
14	1·5916	1·5943	1·5988	1·6024	1·6077
15	1·5989	1·6017	1·6064	1·6101	1·6156
16	1·6055	1·6084	1·6133	1·6171	1·6229
20	1·6272	1·6304	1·6359	1·6402	1·6466

TABLE II.

AND ASHLAR, CAST AND WROUGHT IRON (NEW),

S per thousand, suited to Aqueducts.

N=0·013.

R	S per thousand. 0·3	0·2	0·15	0·10	0·05
1·75	1·2678	1·2604	1·2533	1·2404	1·2090
2·	1·2957	1·2898	1·2842	1·2739	1·2486
2·25	1·3198	1·3153	1·3109	1·3030	1·2833
2·5	1·3409	1·3376	1·3345	1·3287	1·3143
2·75	1·3596	1·3575	1·3555	1·3516	1·3421
3·	1·3763	1·3752	1·3741	1·3722	1·3674
3·25	1·3914	1·3914	1·3912	1·3910	1·3904
3·5	1·4052	1·4060	1·4067	1·4081	1·4117
3·75	1·4177	1·4193	1·4209	1·4239	1·4313
4·	1·4293	1·4318	1·4341	1·4384	1·4496
4·25	1·4399	1·4432	1·4463	1·4519	1·4666
4·5	1·4499	1·4538	1·4575	1·4646	1·4826
4·75	1·4592	1·4638	1·4681	1·4763	1·4976
5·	1·4678	1·4730	1·4780	1·4874	1·5116
5·25	1·4760	1·4818	1·4873	1·4978	1·5249
5·5	1·4836	1·4900	1·4961	1·5076	1·5375
5·75	1·4909	1·4978	1·5044	1·5169	1·5495
6·	1·4977	1·5051	1·5122	1·5257	1·5609
6·5	1·5103	1·5187	1·5267	1·5421	1·5821
7·	1·5217	1·5310	1·5399	1·5569	1·6015
7·5	1·5321	1·5422	1·5520	1·5705	1·6193
8·	1·5417	1·5525	1·5630	1·5830	1·6358
8·5	1·5504	1·5620	1·5732	1·5945	1·6511
9·	1·5586	1·5708	1·5826	1·6053	1·6653
9·5	1·5661	1·5790	1·5915	1·6153	1·6787
10	1·5732	1·5866	1·5996	1·6246	1·6912
11	1·5860	1·6005	1·6146	1·6416	1·7140
12	1·5973	1·6128	1·6278	1·6568	1·7345
13	1·6074	1·6238	1·6397	1·6703	1·7529
14	1·6165	1·6337	1·6504	1·6826	1·7697
15	1·6249	1·6428	1·6602	1·6939	1·7851
16	1·6324	1·6510	1·6691	1·7041	1·7992
20	1·6573	1·6782	1·6985	1·7380	1·8462

TABLE II.

COEFFICIENTS (C) OF MEAN VELOCITY FOR NEW RUBBLE, OLD BRICK-

Corresponding to Values of R and S per

N=0·017.

R	S per thousand. 1·0 and upwards.	0·8	0·6	0·5	0·4
0·10	0·4454	0·4426	0·4379	0·4344	0·4292
0·15	0·5116	0·5086	0·5039	0·5002	0·4949
0·20	0·5613	0·5583	0·5536	0·5499	0·5445
0·25	0·6011	0·5982	0·5935	0·5899	0·5846
0·3	0·6344	0·6316	0·6269	0·6234	0·6182
0·35	0·6629	0·6601	0·6556	0·6521	0·6470
0·4	0·6878	0·6851	0·6807	0·6773	0·6723
0·45	0·7099	0·7073	0·7030	0·6997	0·6948
0·5	0·7297	0·7272	0·7230	0·7198	0·7151
0·55	0·7477	0·7452	0·7412	0·7381	0·7335
0·6	0·7641	0·7617	0·7578	0·7548	0·7503
0·65	0·7792	0·7769	0·7731	0·7702	0·7658
0·7	0·7931	0·7909	0·7872	0·7844	0·7802
0·75	0·8061	0·8039	0·8004	0·7976	0·7936
0·8	0·8182	0·8161	0·8127	0·8100	0·8061
0·9	0·8402	0·8382	0·8350	0·8325	0·8288
1·0	0·8597	0·8579	0·8549	0·8526	0·8491
1·1	0·8773	0·8756	0·8728	0·8707	0·8674
1·2	0·8932	0·8916	0·8890	0·8870	0·8840
1·25	0·9006	0·8991	0·8966	0·8946	0·8917
1·3	0·9077	0·9062	0·9038	0·9019	0·8991
1·4	0·9211	0·9197	0·9174	0·9156	0·9131
1·5	0·9334	0·9321	0·9301	0·9284	0·9260
1·6	0·9448	0·9436	0·9417	0·9401	0·9379
1·7	0·9555	0·9544	0·9527	0·9512	0·9492
1·8	0·9655	0·9645	0·9629	0·9616	0·9597
1·9	0·9749	0·9739	0·9724	0·9713	0·9696
2·0	0·9837	0·9828	0·9815	0·9804	0·9788
2·1	0·9920	0·9912	0·9900	0·9890	0·9876
2·2	0·9999	0·9992	0·9981	0·9973	0·9960
2·3	1·0073	1·0067	1·0057	1·0050	1·0038
2·4	1·0144	1·0139	1·0130	1·0124	1·0113
2·5	1·0212	1·0207	1·0199	1·0194	1·0185

TABLE II.

WORK OR ASHLAR, AND OLD IRON AND UNGLAZED STONEWARE,

thousand, suited to Culverts and Pipes.

N=0·017.

R	S per thousand. 0·3	0·2	0·15	0·10	0·05
0·10	0·4210	0·4061	0·3931	0·3711	0·3264
0·15	0·4863	0·4709	0·4572	0·4340	0·3859
0·2	0·5360	0·5204	0·5065	0·4827	0·4330
0·25	0·5761	0·5605	0·5467	0·5228	0·4723
0·3	0·6098	0·5944	0·5807	0·5569	0·5062
0·35	0·6388	0·6237	0·6102	0·5867	0·5361
0·4	0·6643	0·6496	0·6363	0·6131	0·5629
0·45	0·6870	0·6726	0·6596	0·6368	0·5872
0·5	0·7075	0·6934	0·6807	0·6584	0·6095
0·55	0·7261	0·7124	0·7000	0·6782	0·6301
0·6	0·7431	0·7298	0·7177	0·6964	0·6492
0·65	0·7588	0·7459	0·7341	0·7133	0·6671
0·7	0·7734	0·7609	0·7494	0·7291	0·6838
0·75	0·7870	0·7748	0·7637	0·7439	0·6996
0·8	0·7997	0·7879	0·7770	0·7578	0·7145
0·9	0·8228	0·8117	0·8015	0·7833	0·7421
1·0	0·8435	0·8331	0·8235	0·8063	0·7672
1·1	0·8621	0·8523	0·8433	0·8272	0·7901
1·2	0·8791	0·8699	0·8615	0·8463	0·8113
1·25	0·8870	0·8781	0·8700	0·8553	0·8213
1·3	0·8945	0·8860	0·8781	0·8639	0·8310
1·4	0·9088	0·9009	0·8935	0·8802	0·8493
1·5	0·9221	0·9147	0·9078	0·8954	0·8665
1·6	0·9344	0·9275	0·9211	0·9096	0·8826
1·7	0·9458	0·9395	0·9336	0·9230	0·8978
1·8	0·9566	0·9508	0·9454	0·9355	0·9122
1·9	0·9667	0·9614	0·9564	0·9473	0·9259
2·0	0·9763	0·9714	0·9668	0·9586	0·9389
2·1	0·9853	0·9809	0·9767	0·9692	0·9513
2·2	0·9938	0·9898	0·9861	0·9794	0·9631
2·3	1·0019	0·9984	0·9951	0·9890	0·9744
2·4	1·0097	1·0065	1·0036	0·9982	0·9853
2·5	1·0171	1·0143	1·0118	1·0070	0·9957

TABLE II.

COEFFICIENTS (C) OF MEAN VELOCITY FOR NEW

Corresponding to Values of R and

N=0·017.

R	S per thousand. 1·0 and upwards.	0·8	0·6	0·5	0·4
1·75	0·9606	0·9596	0·9578	0·9565	0·9545
2·	0·9837	0·9828	0·9815	0·9804	0·9788
2·25	1·0036	1·0030	1·0019	1·0012	0·9999
2·5	1·0212	1·0207	1·0199	1·0194	1·0185
2·75	1·0368	1·0365	1·0359	1·0356	1·0350
3·	1·0508	1·0506	1·0503	1·0502	1·0500
3·25	1·0634	1·0634	1·0634	1·0634	1·0634
3·5	1·0750	1·0751	1·0753	1·0755	1·0758
3·75	1·0856	1·0858	1·0861	1·0864	1·0869
4·	1·0953	1·0957	1·0962	1·0967	1·0974
4·25	1·1043	1·1048	1·1056	1·1062	1·1071
4·5	1·1127	1·1133	1·1142	1·1149	1·1160
4·75	1·1206	1·1213	1·1223	1·1232	1·1244
5·	1·1279	1·1287	1·1299	1·1309	1·1323
5·25	1·1348	1·1357	1·1370	1·1381	1·1397
5·5	1·1414	1·1423	1·1438	1·1450	1·1467
5·75	1·1476	1·1485	1·1501	1·1515	1·1534
6·	1·1533	1·1544	1·1561	1·1576	1·1596
6·5	1·1641	1·1653	1·1673	1·1690	1·1712
7·	1·1738	1·1751	1·1773	1·1792	1·1817
7·5	1·1827	1·1842	1·1866	1·1886	1·1914
8·	1·1909	1·1925	1·1951	1·1972	1·2002
8·5	1·1984	1·2001	1·2029	1·2051	1·2083
9·	1·2054	1·2072	1·2101	1·2124	1·2159
9·5	1·2119	1·2138	1·2169	1·2194	1·2230
10	1·2180	1·2199	1·2232	1·2258	1·2295
11	1·2290	1·2311	1·2346	1·2374	1·2415
12	1·2388	1·2410	1·2448	1·2477	1·2521
13	1·2475	1·2499	1·2539	1·2569	1·2617
14	1·2555	1·2580	1·2621	1·2654	1·2703
15	1·2627	1·2653	1·2696	1·2730	1·2782
16	1·2692	1·2719	1·2764	1·2799	1·2853
20	1·2909	1·2939	1·2990	1·3030	1·3090

TABLE II.

Rubble, and Old Brickwork or Ashlar,

S per thousand, suited to Aqueducts.

N=0·017.

R	S per thousand. 0·3	0·2	0·15	0·10	0·05
1·75	0·9513	0·9452	0·9396	0·9293	0·9051
2·	0·9763	0·9714	0·9668	0·9586	0·9389
2·25	0·9979	0·9942	0·9907	0·9842	0·9688
2·5	1·0171	1·0143	1·0118	1·0070	0·9957
2·75	1·0341	1·0322	1·0306	1·0275	1·0200
3·	1·0494	1·0485	1·0476	1·0461	1·0422
3·25	1·0633	1·0633	1·0632	1·0630	1·0627
3·5	1·0760	1·0767	1·0774	1·0786	1·0815
3·75	1·0877	1·0890	1·0905	1·0929	1·0991
4·	1·0985	1·1005	1·1026	1·1063	1·1154
4·25	1·1085	1·1112	1·1139	1·1187	1·1308
4·5	1·1178	1·1211	1·1244	1·1303	1·1452
4·75	1·1265	1·1305	1·1343	1·1413	1·1588
5·	1·1347	1·1392	1·1435	1·1515	1·1716
5·25	1·1424	1·1474	1·1522	1·1612	1·1837
5·5	1·1496	1·1552	1·1605	1·1704	1·1953
5·75	1·1565	1·1625	1·1683	1·1791	1·2063
6·	1·1630	1·1695	1·1757	1·1873	1·2168
6·5	1·1750	1·1824	1·1895	1·2027	1·2364
7·	1·1860	1·1942	1·2020	1·2168	1·2544
7·5	1·1960	1·2049	1·2135	1·2297	1·2711
8·	1·2052	1·2148	1·2241	1·2416	1·2865
8·5	1·2137	1·2240	1·2339	1·2526	1·3008
9·	1·2216	1·2325	1·2430	1·2629	1·3143
9·5	1·2289	1·2404	1·2515	1·2725	1·3269
10	1·2358	1·2479	1·2595	1·2815	1·3388
11	1·2483	1·2714	1·2740	1·2980	1·3606
12	1·2594	1·2734	1·2870	1·3127	1·3802
13	1·2693	1·2842	1·2986	1·3259	1·3980
14	1·2783	1·2940	1·3091	1·3380	1·4143
15	1·2866	1·3029	1·3188	1·3490	1·4292
16	1·2941	1·3111	1·3276	1·3591	1·4429
20	1·3189	1·3381	1·3568	1·3927	1·4891

TABLE II.

COEFFICIENTS (C) OF MEAN VELOCITY FOR DAMAGED

HIGHEST ORDER AND IN THE

Corresponding to Values of R and S per

N=0·020.

R	S per thousand. 1·0 and upwards.	0·8	0·6	0·5	0·4
0·4	0·5613	0·5591	0·5554	0·5526	0·5485
0·5	0·5982	0·5961	0·5926	0·5899	0·5859
0·6	0·6287	0·6267	0·6234	0·6208	0·6171
0·7	0·6546	0·6528	0·6496	0·6472	0·6437
0·8	0·6772	0·6754	0·6724	0·6701	0·6668
0·9	0·6970	0·6953	0·6926	0·6904	0·6873
1·0	0·7148	0·7132	0·7106	0·7085	0·7056
1·25	0·7521	0·7508	0·7486	0·7469	0·7443
1·5	0·7823	0·7812	0·7793	0·7779	0·7758
1·75	0·8075	0·8065	0·8050	0·8039	0·8021
2·	0·8290	0·8282	0·8270	0·8261	0·8247
2·25	0·8477	0·8471	0·8462	0·8454	0·8443
2·5	0·8642	0·8637	0·8631	0·8625	0·8617
2·75	0·8789	0·8786	0·8782	0·8779	0·8773
3·	0·8921	0·8920	0·8917	0·8916	0·8913
3·25	0·9041	0·9041	0·9041	0·9041	0·9041
3·5	0·9151	0·9152	0·9154	0·9155	0·9157
4·	0·9346	0·9349	0·9354	0·9358	0·9364
4·5	0·9513	0·9518	0·9526	0·9533	0·9543
5·	0·9659	0·9666	0·9677	0·9686	0·9699
5·5	0·9789	0·9797	0·9811	0·9822	0·9838
6·	0·9905	0·9914	0·9930	0·9943	0·9962
6·5	1·0009	1·0020	1·0039	1·0053	1·0075
7·	1·0104	1·0116	1·0137	1·0153	1·0177
7·5	1·0190	1·0204	1·0227	1·0244	1·0270
8·	1·0270	1·0285	1·0309	1·0328	1·0357
8·5	1·0344	1·0360	1·0386	1·0406	1·0436
9	1·0413	1·0430	1·0457	1·0478	1·0510
10	1·0537	1·0555	1·0585	1·0609	1·0644
11	1·0645	1·0665	1·0698	1·0724	1·0762
12	1·0742	1·0763	1·0798	1·0826	1·0867
13	1·0829	1·0851	1·0888	1·0918	1·0961
14	1·0907	1·0930	1·0969	1·1000	1·1046
15	1·0979	1·1003	1·1044	1·1077	1·1124
16	1·1044	1·1069	1·1112	1·1146	1·1195
20	1·1260	1·1289	1·1337	1·1375	1·1431

TABLE II.

Rubble, or for Earthwork, in Class I., of the most Perfect Condition,

thousand, suited to Canals and Channels.

N=0·020.

R	S per thousand. 0·3	0·2	0·15	0·10	0·05
0·4	0·5419	0·5298	0·5189	0·5002	0·4602
0·5	0·5796	0·5680	0·5575	0·5393	0·5001
0·6	0·6110	0·5999	0·5899	0·5724	0·5343
0·7	0·6380	0·6274	0·6178	0·6011	0·5643
0·8	0·6614	0·6514	0·6423	0·6263	0·5910
0·9	0·6822	0·6727	0·6641	0·6489	0·6152
1·0	0·7008	0·6919	0·6838	0·6694	0·6372
1·25	0·7403	0·7327	0·7257	0·7132	0·6851
1·5	0·7724	0·7660	0·7600	0·7495	0·7253
1·75	0·7993	0·7940	0·7891	0·7803	0·7599
2·	0·8224	0·8181	0·8142	0·8070	0·7904
2·25	0·8426	0·8393	0·8362	0·8306	0·8175
2·5	0·8605	0·8580	0·8558	0·8517	0·8420
2·75	0·8764	0·8748	0·8734	0·8706	0·8642
3·	0·8909	0·8900	0·8893	0·8879	0·8846
3·25	0·9040	0·9039	0·9038	0·9037	0·9034
3·5	0·9161	0·9167	0·9172	0·9183	0·9208
4·	0·9374	0·9393	0·9411	0·9443	0·9522
4·5	0·9559	0·9589	0·9618	0·9670	0·9799
5·	0·9720	0·9761	0·9800	0·9871	1·0047
5·5	0·9864	0·9915	0·9962	1·0051	1·0270
6·	0·9993	1·0052	1·0109	1·0213	1·0472
6·5	1·0110	1·0177	1·0241	1·0360	1·0658
7·	1·0216	1·0291	1·0362	1·0495	1·0829
7·5	1·0313	1·0395	1·0474	1·0620	1·0987
8·	1·0404	1·0492	1·0576	1·0735	1·1135
8·5	1·0487	1·0581	1·0671	1·0841	1·1272
9	1·0563	1·0664	1·0760	1·0941	1·1401
10	1·0702	1·0814	1·0921	1·1122	1·1637
11	1·0825	1·0947	1·1063	1·1283	1·1848
12	1·0934	1·1065	1·1190	1·1427	1·2038
13	1·1033	1·1171	1·1305	1·1557	1·2211
14	1·1122	1·1268	1·1409	1·1675	1·2369
15	1·1203	1·1357	1·1504	1·1784	1·2515
16	1·1278	1·1438	1·1591	1·1883	1·2649
20	1·1525	1·1707	1·1882	1·2217	1·3104

TABLE II.

COEFFICIENTS (C) OF MEAN VELOCITY FOR

Corresponding to Values of R and S per

N=0·0225.

R	S per thousand. 1·0 and upwards.	0·8	0·6	0·5	0·4
0·4	0·4841	0·4822	0·4790	0·4766	0·4730
0·5	0·5176	0·5157	0·5127	0·5103	0·5069
0·6	0·5454	0·5436	0·5408	0·5385	0·5352
0·7	0·5692	0·5675	0·5648	0·5627	0·5595
0·8	0·5900	0·5884	0·5858	0·5837	0·5808
0·9	0·6083	0·6068	0·6043	0·6024	0·5996
1·0	0·6247	0·6233	0·6210	0·6192	0·6166
1·25	0·6596	0·6583	0·6564	0·6549	0·6526
1·5	0·6878	0·6868	0·6852	0·6839	0·6820
1·75	0·7115	0·7107	0·7093	0·7083	0·7067
2·	0·7319	0·7312	0·7301	0·7293	0·7280
2·25	0·7496	0·7491	0·7483	0·7476	0·7466
2·5	0·7654	0·7650	0·7643	0·7638	0·7631
2·75	0·7794	0·7791	0·7787	0·7784	0·7779
3·	0·7921	0·7919	0·7917	0·7915	0·7913
3·25	0·8036	0·8036	0·8036	0·8035	0·8035
3·5	0·8142	0·8142	0·8144	0·8145	0·8147
4·	0·8329	0·8332	0·8337	0·8341	0·8346
4·5	0·8491	0·8495	0·8503	0·8510	0·8518
5·	0·8632	0·8639	0·8649	0·8658	0·8669
5·5	0·8758	0·8766	0·8779	0·8790	0·8804
6·	0·8871	0·8880	0·8895	0·8908	0·8925
6·5	0·8973	0·8984	0·9001	0·9015	0·9034
7·	0·9066	0·9077	0·9097	0·9112	0·9134
7·5	0·9151	0·9164	0·9185	0·9202	0·9226
8·	0·9230	0·9243	0·9266	0·9284	0·9310
8·5	0·9302	0·9316	0·9341	0·9361	0·9390
9	0·9369	0·9385	0·9411	0·9431	0·9461
10	0·9491	0·9508	0·9537	0·9559	0·9592
11	0·9598	0·9617	0·9648	0·9673	0·9709
12	0·9694	0·9714	0·9747	0·9774	0·9812
13	0·9780	0·9801	0·9836	0·9865	0·9905
14	0·9857	0·9880	0·9917	0·9947	0·9990
15	0·9929	0·9952	0·9991	1·0022	1·0067
16	0·9994	1·0018	1·0059	1·0091	1·0138
20	1·0209	1·0237	1·0283	1·0320	1·0373

TABLE II.

EARTHWORK, IN CLASS II., ABOVE THE AVERAGE,

thousand, suited to Canals and Channels.

N=0·0225.

R	S per thousand. 0·3	0·2	0·15	0·10	0·05
0·4	0·4673	0·4569	0·4476	0·4316	0·3980
0·5	0·5014	0·4914	0·4823	0·4668	0·4336
0·6	0·5300	0·5203	0·5116	0·4966	0·4642
0·7	0·5545	0·5453	0·5370	0·5225	0·4912
0·8	0·5760	0·5673	0·5593	0·5455	0·5153
0·9	0·5952	0·5868	0·5793	0·5661	0·5371
1·0	0·6124	0·6045	0·5974	0·5848	0·5571
1·25	0·6490	0·6422	0·6360	0·6251	0·6007
1·5	0·6789	0·6732	0·6679	0·6586	0·6375
1·75	0·7042	0·6994	0·6950	0·6872	0·6694
2·	0·7259	0·7221	0·7185	0·7122	0·6975
2·25	0·7450	0·7420	0·7392	0·7343	0·7227
2·5	0·7620	0·7598	0·7577	0·7540	0·7455
2·75	0·7772	0·7757	0·7744	0·7719	0·7662
3·	0·7909	0·7902	0·7895	0·7882	0·7852
3·25	0·8035	0·8034	0·8033	0·8032	0·8029
3·5	0·8150	0·8156	0·8161	0·8170	0·8193
4·	0·8355	0·8372	0·8389	0·8418	0·8489
4·5	0·8533	0·8561	0·8587	0·8635	0·8751
5·	0·8689	0·8727	0·8763	0·8828	0·8986
5·5	0·8829	0·8875	0·8919	0·9001	0·9198
6·	0·8954	0·9009	0·9061	0·9157	0·9392
6·5	0·9067	0·9130	0·9189	0·9299	0·9570
7·	0·9171	0·9241	0·9307	0·9430	0·9733
7·5	0·9266	0·9343	0·9415	0·9550	0·9886
8·	0·9354	0·9437	0·9515	0·9662	1·0028
8·5	0·9435	0·9524	0·9608	0·9766	1·0160
9	0·9510	0·9605	0·9695	0·9863	1·0285
10	0·9647	0·9752	0·9853	1·0040	1·0513
11	0·9768	0·9883	0·9992	1·0197	1·0718
12	0·9876	1·0000	1·0117	1·0339	1·0903
13	0·9974	1·0105	1·0230	1·0466	1·1072
14	1·0062	1·0200	1·0333	1·0583	1·1226
15	1·0143	1·0288	1·0428	1·0691	1·1369
16	1·0217	1·0368	1·0514	1·0789	1·1502
20	1·0463	1·0636	1·0803	1·1120	1·1949

TABLE II.

COEFFICIENTS (C) OF MEAN VELOCITY, FOR EARTH-

Corresponding to Values of R and S per

N=0·0275.

R	S per thousand. 1·0 and upwards.	0·8	0·6	0·5	0·4
0·4	0·3762	0·3747	0·3722	0·3703	0·3676
0·5	0·4043	0·4029	0·4005	0·3987	0·3960
0·6	0·4279	0·4265	0·4242	0·4225	0·4199
0·7	0·4483	0·4469	0·4448	0·4432	0·4406
0·8	0·4662	0·4649	0·4628	0·4613	0·4588
0·9	0·4821	0·4808	0·4789	0·4774	0·4751
1·0	0·4964	0·4952	0·4934	0·4919	0·4898
1·25	0·5270	0·5260	0·5244	0·5231	0·5213
1·5	0·5521	0·5513	0·5499	0·5488	0·5473
1·75	0·5733	0·5726	0·5715	0·5705	0·5693
2·	0·5917	0·5911	0·5902	0·5894	0·5884
2·25	0·6078	0·6073	0·6066	0·6060	0·6052
2·5	0·6221	0·6218	0·6213	0·6208	0·6202
2·75	0·6350	0·6348	0·6344	0·6341	0·6337
3·	0·6467	0·6465	0·6463	0·6462	0·6460
3·25	0·6573	0·6573	0·6573	0·6573	0·6572
3·5	0·6671	0·6672	0·6673	0·6674	0·6676
4·	0·6846	0·6848	0·6852	0·6856	0·6860
4·5	0·6998	0·7002	0·7008	0·7014	0·7021
5·	0·7131	0·7137	0·7146	0·7153	0·7163
5·5	0·7251	0·7257	0·7270	0·7277	0·7290
6·	0·7358	0·7366	0·7379	0·7389	0·7405
6·5	0·7455	0·7464	0·7479	0·7491	0·7509
7·	0·7544	0·7554	0·7571	0·7584	0·7604
7·5	0·7626	0·7637	0·7655	0·7670	0·7692
8·	0·7701	0·7713	0·7733	0·7749	0·7773
8·5	0·7771	0·7784	0·7806	0·7823	0·7848
9	0·7836	0·7850	0·7873	0·7891	0·7918
10	0·7954	0·7970	0·7995	0·8015	0·8045
11	0·8059	0·8076	0·8103	0·8125	0·8158
12	0·8152	0·8170	0·8200	0·8224	0·8259
13	0·8236	0·8256	0·8288	0·8313	0·8350
14	0·8313	0·8333	0·8367	0·8394	0·8433
15	0·8383	0·8404	0·8440	0·8468	0·8509
16	0·8447	0·8469	0·8506	0·8536	0·8579
20	0·8661	0·8687	0·8729	0·8763	0·8812

TABLE II.

WORK, IN CLASS IV., BELOW THE AVERAGE,

thousand, suited to Canals and Channels.

N=0·0275.

R	S per thousand. 0·3	0·2	0·15	0·10	0·05
0·4	0·3632	0·3553	0·3483	0·3363	0·3116
0·5	0·3917	0·3840	0·3771	0·3653	0·3407
0·6	0·4158	0·4083	0·4016	0·3901	0·3659
0·7	0·4367	0·4295	0·4230	0·4119	0·3883
0·8	0·4551	0·4482	0·4420	0·4313	0·4084
0·9	0·4715	0·4650	0·4590	0·4488	0·4267
1·0	0·4864	0·4802	0·4745	0·4647	0·4436
1·25	0·5184	0·5129	0·5080	0·4994	0·4805
1·5	0·5448	0·5401	0·5359	0·5285	0·5121
1·75	0·5672	0·5633	0·5598	0·5535	0·5395
2·	0·5867	0·5836	0·5807	0·5755	0·5640
2·25	0·6039	0·6014	0·5991	0·5951	0·5859
2·5	0·6193	0·6174	0·6157	0·6127	0·6059
2·75	0·6331	0·6319	0·6308	0·6287	0·6242
3·	0·6457	0·6451	0·6445	0·6434	0·6411
3·25	0·6572	0·6572	0·6571	0·6570	0·6567
3·5	0·6679	0·6683	0·6688	0·6695	0·6714
4·	0·6869	0·6883	0·6897	0·6921	0·6979
4·5	0·7034	0·7058	0·7081	0·7121	0·7216
5·	0·7181	0·7213	0·7244	0·7298	0·7429
5·5	0·7312	0·7352	0·7390	0·7459	0·7623
6·	0·7430	0·7478	0·7523	0·7604	0·7800
6·5	0·7538	0·7593	0·7644	0·7738	0·7964
7·	0·7636	0·7698	0·7755	0·7860	0·8117
7·5	0·7727	0·7795	0·7857	0·7974	0·8257
8·	0·7811	0·7884	0·7953	0·8080	0·8389
8·5	0·7889	0·7968	0·8042	0·8178	0·8512
9	0·7962	0·8046	0·8125	0·8271	0·8629
10	0·8094	0·8188	0·8276	0·8439	0·8844
11	0·8212	0·8314	0·8411	0·8590	0·9037
12	0·8317	0·8427	0·8532	0·8726	0·9212
13	0·8412	0·8530	0·8642	0·8850	0·9373
14	0·8498	0·8623	0·8742	0·8963	0·9521
15	0·8578	0·8709	0·8834	0·9068	0·9658
16	0·8651	0·8788	0·8919	0·9164	0·9785
20	0·8894	0·9052	0·9204	0·9488	1·0219

TABLE II.

COEFFICIENTS (C) OF MEAN VELOCITY, FOR EARTH-BEDS PARTLY OVERGROWN, OR

Corresponding to Values of R and S per

N=0·030.

R	S per thousand. 1·0 and upwards.	0·8	0·6	0·5	0·4
0·4	0·3373	0·3360	0·3338	0·3321	0·3297
0·5	0·3633	0·3620	0·3599	0·3582	0·3559
0·6	0·3852	0·3840	0·3819	0·3803	0·3780
0·7	0·4042	0·4030	0·4010	0·3995	0·3973
0·8	0·4209	0·4197	0·4179	0·4164	0·4143
0·9	0·4358	0·4347	0·4329	0·4315	0·4295
1·0	0·4493	0·4482	0·4465	0·4452	0·4433
1·25	0·4781	0·4772	0·4757	0·4746	0·4729
1·5	0·5019	0·5011	0·4999	0·4989	0·4975
1·75	0·5220	0·5214	0·5204	0·5196	0·5184
2·	0·5395	0·5390	0·5382	0·5375	0·5365
2·25	0·5549	0·5545	0·5539	0·5534	0·5526
2·5	0·5687	0·5684	0·5679	0·5675	0·5669
2·75	0·5810	0·5808	0·5805	0·5803	0·5799
3·	0·5922	0·5921	0·5920	0·5918	0·5916
3·25	0·6025	0·6025	0·6025	0·6025	0·6025
3·5	0·6120	0·6121	0·6122	0·6123	0·6124
4·	0·6289	0·6291	0·6295	0·6298	0·6303
4·5	0·6436	0·6440	0·6446	0·6450	0·6458
5·	0·6566	0·6571	0·6580	0·6586	0·6596
5·5	0·6682	0·6688	0·6699	0·6708	0·6720
6·	0·6787	0·6794	0·6807	0·6817	0·6831
6·5	0·6882	0·6890	0·6905	0·6916	0·6933
7·	0·6969	0·6978	0·6994	0·7007	0·7026
7·5	0·7049	0·7060	0·7077	0·7091	0·7111
8·	0·7123	0·7134	0·7154	0·7169	0·7191
8·5	0·7192	0·7204	0·7225	0·7241	0·7265
9	0·7256	0·7269	0·7291	0·7308	0·7333
10	0·7372	0·7387	0·7411	0·7430	0·7459
11	0·7475	0·7491	0·7518	0·7539	0·7570
12	0·7568	0·7585	0·7614	0·7636	0·7670
13	0·7651	0·7669	0·7700	0·7724	0·7760
14	0·7727	0·7746	0·7779	0·7804	0·7842
15	0·7796	0·7817	0·7851	0·7877	0·7917
16	0·7860	0·7881	0·7917	0·7945	0·7987
20	0·8073	0·8098	0·8138	0·8171	0·8219

TABLE II.

WORK, IN CLASS V., IN RATHER BAD ORDER, HAVING

PARTLY BLOCKED BY DEPOSITS,

thousand, suited to Canals and Channels.

N=0·030.

R	S per thousand. 0·3	0·2	0·15	0·10	0·05
0·4	0·3258	0·3188	0·3125	0·3021	0·2805
0·5	0·3521	0·3452	0·3389	0·3287	0·3072
0·6	0·3744	0·3677	0·3617	0·3516	0·3304
0·7	0·3938	0·3873	0·3814	0·3717	0·3510
0·8	0·4109	0·4047	0·3992	0·3897	0·3695
0·9	0·4263	0·4204	0·4151	0·4059	0·3865
1·0	0·4402	0·4346	0·4296	0·4208	0·4021
1·25	0·4703	0·4653	0·4609	0·4532	0·4364
1·5	0·4951	0·4910	0·4871	0·4804	0·4658
1·75	0·5164	0·5129	0·5096	0·5040	0·4915
2·	0·5350	0·5321	0·5294	0·5248	0·5144
2·25	0·5514	0·5491	0·5470	0·5433	0·5351
2·5	0·5660	0·5643	0·5628	0·5601	0·5539
2·75	0·5793	0·5782	0·5771	0·5753	0·5712
3·	0·5913	0·5908	0·5902	0·5893	0·5871
3·25	0·6024	0·6024	0·6023	0·6022	0·6020
3·5	0·6127	0·6131	0·6135	0·6142	0·6159
4·	0·6310	0·6323	0·6336	0·6359	0·6411
4·5	0·6470	0·6492	0·6512	0·6550	0·6637
5·	0·6612	0·6642	0·6671	0·6721	0·6841
5·5	0·6740	0·6777	0·6813	0·6876	0·7026
6·	0·6855	0·6899	0·6941	0·7017	0·7197
6·5	0·6960	0·7011	0·7059	0·7146	0·7354
7·	0·7056	0·7113	0·7167	0·7265	0·7500
7·5	0·7145	0·7208	0·7267	0·7376	0·7636
8·	0·7227	0·7296	0·7360	0·7478	0·7764
8·5	0·7303	0·7377	0·7446	0·7574	0·7883
9	0·7375	0·7454	0·7528	0·7665	0·7996
10	0·7505	0·7593	0·7676	0·7830	0·8205
11	0·7621	0·7717	0·7808	0·7978	0·8393
12	0·7724	0·7829	0·7928	0·8111	0·8564
13	0·7818	0·7930	0·8036	0·8233	0·8721
14	0·7904	0·8022	0·8135	0·8344	0·8865
15	0·7983	0·8107	0·8226	0·8447	0·9000
16	0·8055	0·8186	0·8310	0·8542	0·9124
20	0·8297	0·8448	0·8593	0·8863	0·9551

TABLE III.

VALUES OF THE EXPRESSION $100\sqrt{RS}$,

1. SUITABLE TO CULVERTS AND PIPES,

2. SUITABLE TO CANALS AND CHANNELS,

FOR USE IN THE GENERAL FORMULÆ,

$$Q=C\,.\,A\,.\,100\sqrt{RS},$$

$$V=C\,.\,100\sqrt{RS}.$$

TABLE III.

VALUES OF THE EXPRESSION

Corresponding to values

R	S per thousand. 20	18	17	16	15	14	13
0·05	3·162	3·	2·915	2·828	2·738	2·648	2·549
0·10	4·472	4·243	4·123	4·	3·873	3·742	3·606
0·15	5·477	5·196	5·050	4·898	4·743	4·583	4·416
0·20	6·325	6·	5·831	5·656	5·476	5·292	5·099
0·25	7·071	6·708	6·519	6·325	6·123	5·916	5·701
0·30	7·746	7·348	7·141	6·928	6·708	6·481	6·245
0·35	8·367	7·937	7·713	7·484	7·246	7·	6·745
0·40	8·944	8·485	8·246	8·	7·746	7·483	7·211
0·45	9·487	9·	8·746	8·486	8·216	7·937	7·647
0·50	10·	9·487	9·220	8·944	8·660	8·367	8·062
0·6	10·954	10·392	10·100	9·797	9·487	9·165	8·832
0·7	11·832	11·225	10·909	10·583	10·247	9·899	9·539
0·8	12·649	12·	11·662	11·314	10·954	10·583	10·198
0·9	13·416	12·728	12·369	12·	11·619	11·225	10·817
1·0	14·142	13·416	13·038	12·649	12·247	11·832	11·402
1·1	14·832	14·071	13·675	13·266	12·845	12·410	11·958
1·2	15·492	14·697	14·283	13·856	13·416	12·961	12·490
1·3	16·125	15·297	14·866	14·422	13·964	13·491	13·
1·4	16·733	15·875	15·427	14·967	14·491	14·	13·491
1·5	17·321	16·432	15·969	15·492	15·	14·491	13·964
1·6	17·889	16·971	16·492	16·	15·492	14·967	14·422
1·7	18·439	17·493	17·	16·492	15·969	15·427	14·866
1·8	18·974	18·	17·493	16·971	16·432	15·875	15·294
1·9	19·494	18·493	17·972	17·436	16·882	16·310	15·716
2·0	20·	18·974	18·439	17·889	17·321	16·733	16·125
2·1							
2·2							
2·3							
2·4							
2·5							
2·6							
2·7							
2·8							
2·9							
3·0							

TABLE III.

$100\sqrt{RS}$, suitable to Culverts and Pipes,

of R and S per thousand.

R	S per thousand. 12	11	10	9	8	7	6
0·05	2·449	2·345	2·236	2·121	2·	1·871	1·732
0·10	3·464	3·317	3·162	3·	2·828	2·648	2·449
0·15	4·243	4·062	3·873	3·674	3·464	3·240	3·
0·20	4·899	4·690	4·472	4·243	4·	3·742	3·464
0·25	5·477	5·244	5·	4·743	4·472	4·183	3·873
0·30	6·	5·745	5·477	5·196	4·898	4·583	4·243
0·35	6·480	6·205	5·916	5·612	5·292	4·950	4·583
0·40	6·928	6·633	6·325	6·	5·656	5·292	4·899
0·45	7·348	7·035	6·708	6·364	6·	5·612	5·196
0·50	7·746	7·416	7·071	6·708	6·325	5·916	5·477
0·6	8·486	8·124	7·746	7·348	6·928	6·481	6·
0·7	9·165	8·775	8·367	7·937	7·484	7·	6·480
0·8	9·798	9·381	8·944	8·485	8·	7·483	6·928
0·9	10·392	9·950	9·487	9·	8·486	7·937	7·348
1·0	10·954	10·488	10·	9·487	8·944	8·367	7·746
1·1	11·489	11·	10·488	9·950	9·381	8·775	8·124
1·2	12·	11·489	10·954	10·392	9·797	9·165	8·486
1·3	12·490	11·958	11·402	10·817	10·198	9·539	8·832
1·4	12·961	12·410	11·832	11·225	10·583	9·899	9·165
1·5	13·416	12·845	12·247	11·619	10·954	10·247	9·487
1·6	13·856	13·266	12·649	12·	11·314	10·583	9·798
1·7	14·283	13·675	13·038	12·369	11·662	10·909	10·100
1·8	14·697	14·071	13·416	12·728	12·	11·225	10·392
1·9	15·100	14·457	13·784	13·077	12·329	11·533	10·677
2·0	15·492	14·832	14·142	13·416	12·650	11·832	10·954
2·1	15·875	15·199	14·491	13·748	12·961	12·124	11·225
2·2	16·248	15·556	14·832	14·071	13·266	12·410	11·489
2·3	16·613	15·906	15·166	14·387	13·565	12·689	11·747
2·4	16·971	16·248	15·492	14·697	13·856	12·961	12·
2·5	17·321	16·583	15·811	15·	14·142	13·229	12·247
2·6	17·664	16·912	16·125	15·297	14·422	13·491	12·490
2·7	18·	17·234	16·432	15·588	14·697	13·748	12·689
2·8	18·330	17·550	16·733	15·875	14·967	14·	12·961
2·9	18·655	17·861	17·029	16·155	15·232	14·248	13·191
3·0	18·974	18·166	17·321	16·432	15·492	14·491	13·416

TABLE III.

VALUES OF THE EXPRESSION

Corresponding to values

R	S per thousand. 5·	4·5	4·	3·5	3·	2·5	2·
0·05	1·581	1·5	1·414	1·324	1·225	1·118	1·
0·10	2·236	2·121	2·	1·871	1·732	1·581	1·414
0·15	2·739	2·598	2·449	2·291	2·121	1·936	1·732
0·20	3·162	3·	2·828	2·648	2·449	2·236	2·
0·25	3·536	3·354	3·162	2·958	2·739	2·5	2·236
0·30	3·873	3·674	3·464	3·240	3·	2·739	2·449
0·35	4·183	3·963	3·742	3·5	3·240	2·958	2·646
0·40	4·472	4·243	4·	3·742	3·464	3·162	2·828
0·45	4·743	4·5	4·243	3·969	3·674	3·354	3·
0·50	5·	4·743	4·472	4·183	3·873	3·536	3·162
0·6	5·477	5·196	4·898	4·583	4·243	3·873	3·464
0·7	5·916	5·612	5·292	4·950	4·583	4·183	3·742
0·8	6·325	6·	5·656	5·292	4·899	4·472	4·
0·9	6·708	6·364	6·	5·612	5·196	4·743	4·243
1·0	7·071	6·708	6·325	5·916	5·477	5·	4·472
1·1	7·416	7·036	6·633	6·205	5·744	5·244	4·690
1·2	7·746	7·348	6·928	6·481	6·	5·477	4·898
1·3	8·062	7·649	7·211	6·745	6·245	5·701	5·098
1·4	8·367	7·937	7·484	7·	6·480	5·916	5·292
1·5	8·660	8·216	7·746	7·246	6·708	6·123	5·477
1·6	8·944	8·485	8·	7·483	6·928	6·325	5·656
1·7	9·220	8·746	8·246	7·714	7·141	6·519	5·831
1·8	9·487	9·	8·486	7·937	7·348	6·708	6·
1·9	9·747	9·247	8·718	8·155	7·550	6·892	6·164
2·0	10·	9·487	8·944	8·367	7·746	7·071	6·325
2·1	10·247	9·721	9·165	8·631	7·937	7·246	6·481
2·2	10·488	9·950	9·381	8·775	8·124	7·416	6·633
2·3	10·724	10·174	9·592	8·972	8·307	7·583	6·782
2·4	10·954	10·392	9·797	9·165	8·486	7·746	6·928
2·5	11·180	10·606	10·	9·354	8·660	7·905	7·071
2·6	11·402	10·817	10·198	9·539	8·832	8·062	7·211
2·7	11·619	11·023	10·392	9·670	9·	8·216	7·348
2·8	11·832	11·225	10·583	9·899	9·165	8·367	7·484
2·9	12·042	11·424	10·770	10·075	9·327	8·515	7·616
3·0	12·247	11·619	10·954	10·247	9·487	8·660	7·746

TABLE III.

$100\sqrt{RS}$, SUITABLE TO CULVERTS AND PIPES,

of R and S per thousand.

R	S per thousand. 1·5	1·	0·95	0·90	0·85	0·80	0·75
0·05	0·866	0·707	0·689	0·671	0·652	0·632	0·612
0·10	1·225	1·	0·975	0·949	0·922	0·894	0·866
0·15	1·5	1·225	1·193	1·162	1·129	1·095	1·060
0·20	1·732	1·414	1·378	1·342	1·304	1·265	1·225
0·25	1·936	1·581	1·541	1·5	1·457	1·414	1·369
0·30	2·121	1·732	1·688	1·643	1·592	1·549	1·5
0·35	2·291	1·871	1·823	1·775	1·725	1·673	1·620
0·40	2·449	2·	1·949	1·897	1·844	1·789	1·732
0·45	2·598	2·121	2·067	2·012	1·956	1·897	1·837
0·50	2·739	2·236	2·179	2·121	2·061	2·	1·936
0·6	3·	2·449	2·387	2·324	2·258	2·191	2·121
0·7	3·240	2·646	2·579	2·510	2·439	2·366	2·291
0·8	3·464	2·828	2·757	2·683	2·608	2·530	2·449
0·9	3·674	3·	2·924	2·846	2·766	2·683	2·598
1·0	3·873	3·162	3·082	3·	2·915	2·828	2·739
1·1	4·062	3·317	3·233	3·146	3·058	2·966	2·872
1·2	4·243	3·464	3·376	3·286	3·194	3·098	3·
1·3	4·416	3·606	3·514	3·421	3·324	3·225	3·122
1·4	4·583	3·742	3·647	3·550	3·450	3·347	3·240
1·5	4·743	3·873	3·775	3·674	3·571	3·464	3·354
1·6	4·899	4·	3·899	3·795	3·688	3·578	3·464
1·7	5·050	4·123	4·019	3·912	3·801	3·688	3·571
1·8	5·196	4·243	4·135	4·025	3·912	3·795	3·674
1·9	5·339	4·359	4·249	4·135	4·019	3·899	3·775
2·0	5·477	4·472	4·359	4·243	4·123	4·	3·873
2·1	5·612	4·583	4·467	4·347	4·225	4·099	3·969
2·2	5·744	4·690	4·572	4·450	4·324	4·195	4·062
2·3	5·874	4·796	4·674	4·550	4·422	4·313	4·153
2·4	6·	4·898	4·775	4·648	4·517	4·382	4·243
2·5	6·123	5·	4·873	4·743	4·610	4·472	4·330
2·6	6·245	5·098	4·970	4·837	4·701	4·561	4·416
2·7	6·364	5·196	5·065	4·930	4·791	4·648	4·500
2·8	6·480	5·292	5·158	5·020	4·879	4·733	4·583
2·9	6·595	5·385	5·249	5·109	4·965	4·817	4·664
3·0	6·708	5·477	5·339	5·196	5·050	4·898	4·743

TABLE III.

VALUES OF THE EXPRESSION

Corresponding to values

R	S per thousand. 0·70	0·65	0·60	0·55	0·50	0·45	0·40
0·05	0·592	0·570	0·548	0·524	0·5	0·474	0·447
0·10	0·837	0·806	0·775	0·742	0·707	0·671	0·632
0·15	1·025	0·987	0·949	0·908	0·866	0·822	0·775
0·20	1·183	1·140	1·095	1·049	1·	0·949	0·894
0·25	1·323	1·275	1·225	1·172	1·118	1·061	1·
0·30	1·449	1·396	1·342	1·284	1·225	1·162	1·095
0·35	1·565	1·508	1·449	1·387	1·323	1·255	1·183
0·40	1·673	1·612	1·549	1·483	1·414	1·342	1·265
0·45	1·775	1·710	1·643	1·573	1·5	1·423	1·342
0·50	1·871	1·803	1·732	1·658	1·581	1·5	1·414
0·6	2·049	1·975	1·897	1·816	1·732	1·643	1·549
0·7	2·214	2·133	2·049	1·962	1·871	1·775	1·673
0·8	2·366	2·280	2·191	2·098	2·	1·897	1·789
0·9	2·510	2·419	2·324	2·225	2·121	2·012	1·897
1·0	2·646	2·550	2·449	2·345	2·236	2·121	2·
1·1	2·775	2·674	2·569	2·460	2·345	2·225	2·098
1·2	2·898	2·793	2·683	2·569	2·449	2·324	2·191
1·3	3·017	2·907	2·793	2·674	2·549	2·419	2·280
1·4	3·130	3·017	2·898	2·775	2·646	2·510	2·366
1·5	3·240	3·122	3·	2·872	2·739	2·598	2·449
1·6	3·347	3·225	3·098	2·966	2·828	2·683	2·530
1·7	3·450	3·324	3·194	3·058	2·915	2·766	2·608
1·8	3·550	3·421	3·286	3·146	3·	2·846	2·683
1·9	3·647	3·514	3·376	3·233	3·082	2·924	2·757
2·0	3·742	3·606	3·464	3·317	3·162	3·	2·828
2·1	3·834	3·695	3·550	3·399	3·240	3·074	2·898
2·2	3·924	3·782	3·633	3·479	3·317	3·146	2·966
2·3	4·012	3·867	3·715	3·557	3·391	3·217	3·033
2·4	4·099	3·950	3·795	3·633	3·464	3·286	3·098
2·5	4·183	4·031	3·873	3·708	3·536	3·354	3·162
2·6	4·266	4·111	3·950	3·782	3·606	3·421	3·225
2·7	4·347	4·189	4·025	3·854	3·674	3·486	3·286
2·8	4·427	4·266	4·099	3·924	3·742	3·550	3·347
2·9	4·506	4·342	4·171	3·994	3·808	3·612	3·406
3·0	4·583	4·416	4·243	4·062	3·873	3·674	3·464

TABLE III.

$100\sqrt{RS}$, SUITABLE TO CULVERTS AND PIPES,

of R and S per thousand.

R	S per thousand. 0·35	0·30	0·25	0·20	0·15	0·10	0·05
0·05	0·418	0·387	0·354	0·316	0·274	0·224	0·158
0·10	0·592	0·548	0·500	0·447	0·387	0·316	0·224
0·15	0·725	0·671	0·612	0·548	0·474	0·387	0·274
0·20	0·837	0·775	0·707	0·632	0·548	0·447	0·316
0·25	0·935	0·866	0·790	0·707	0·612	0·500	0·354
0·30	1·025	0·949	0·866	0·775	0·671	0·548	0·387
0·35	1·107	1·025	0·935	0·837	0·725	0·592	0·418
0·40	1·183	1·095	1·	0·894	0·775	0·632	0·447
0·45	1·255	1·162	1·061	0·949	0·822	0·671	0·474
0·50	1·323	1·225	1·118	1·	0·866	0·707	0·500
0·6	1·449	1·342	1·225	1·095	0·949	0·775	0·548
0·7	1·565	1·449	1·323	1·183	1·025	0·837	0·592
0·8	1·673	1·549	1·414	1·265	1·095	0·894	0·632
0·9	1·775	1·643	1·5	1·342	1·162	0·949	0·671
1·0	1·871	1·732	1·581	1·414	1·225	1·	0·707
1·1	1·962	1·817	1·658	1·483	1·285	1·049	0·742
1·2	2·049	1·897	1·732	1·549	1·342	1·095	0·775
1·3	2·133	1·975	1·803	1·612	1·396	1·140	0·806
1·4	2·214	2·049	1·871	1·673	1·449	1·183	0·837
1·5	2·291	2·121	1·936	1·732	1·500	1·225	0·866
1·6	2·366	2·191	2·	1·789	1·549	1·265	0·894
1·7	2·439	2·258	2·062	1·844	1·597	1·304	0·922
1·8	2·510	2·324	2·121	1·897	1·643	1·342	0·949
1·9	2·579	2·387	2·179	1·949	1·688	1·378	0·975
2·0	2·646	2·449	2·236	2·	1·732	1·414	1·
2·1	2·711	2·510	2·291	2·049	1·775	1·449	1·025
2·2	2·775	2·569	2·345	2·098	1·817	1·483	1·049
2·3	2·837	2·627	2·398	2·145	1·857	1·517	1·072
2·4	2·898	2·683	2·449	2·191	1·897	1·549	1·095
2·5	2·958	2·739	2·500	2·236	1·936	1·581	1·118
2·6	3·017	2·793	2·549	2·280	1·975	1·612	1·140
2·7	3·074	2·847	2·598	2·324	2·012	1·643	1·162
2·8	3·130	2·898	2·646	2·366	2·049	1·673	1·183
2·9	3·186	2·950	2·693	2·408	2·086	1·703	1·204
3·0	3·240	3·	2·739	2·449	2·121	1·732	1·225

TABLE III.

VALUES OF THE EXPRESSION

Corresponding to values

R	S per thousand. 5·0	4·5	4·0	3·5	3·0	2·5	2·0
1.	7·071	6·708	6·325	5·916	5·476	5·	4·472
1·25	7·906	7·5	7·071	6·614	6·123	5·590	5·
1·5	8·660	8·216	7·746	7·246	6·708	6·123	5·477
1·75	9·354	8·874	8·367	7·826	7·246	6·614	5·916
2·	10·	9·487	8·944	8·367	7·746	7·071	6·325
2·25	10·606	10·062	9·487	8·874	8·216	7·5	6·708
2·5	11·180	10·606	10·	9·354	8·660	7·906	7·071
2·75	11·726	11·124	10·488	9·810	9·083	8·291	7·416
3·	12·247	11·619	10·954	10·247	9·487	8·660	7·746
3·25	12·747	12·093	11·402	10·665	9·874	9·014	8·062
3·5	13·229	12·550	11·832	11·068	10·247	9·354	8·367
3·75	13·697	12·990	12·248	11·456	10·611	9·682	8·660
4·	14·142	13·416	12·650	11·832	10·954	10·	8·944
4·25	14·577	13·829	13·038	12·196	11·292	10·308	9·220
4·5	15·	14·230	13·416	12·550	11·619	10·606	9·487
4·75	15·411	14·620	13·784	12·894	11·937	10·897	9·747
5·	15·811	15·	14·142	13·229	12·247	11·180	10·
5·25	16·201	15·375	14·492	13·555	12·550	11·456	10·246
5·5	16·583	15·732	14·832	13·874	12·845	11·726	10·488
5·75	16·956	16·086	15·166	14·186	13·134	11·989	10·724
6·	17·321	16·432	15·492	14·491	13·416	12·247	10·954
6·5	18·028	17·103	16·124	15·083	13·964	12·747	11·402
7·	18·708	17·748	16·734	15·652	14·491	13·229	11·832
7·5	19·365	18·371	17·320	16·202	15·	13·697	12·247
8·	20·	18·974	17·888	16·733	15·492	14·142	12·649
8·5	20·616	19·558	18·440	17·248	15·969	14·577	13·038
9·	21·213	20·125	19·974	17·748	16·432	15·	13·416
10·	22·361	21·213	20·	18·708	17·321	15·811	14·142
11·	23·452	22·249	20·976	19·621	18·166	16·583	14·832
12·	24·495	23·238	21·908	20·494	18·974	17·321	15·492
13·	25·494	24·187	22·804	21·331	19·748	18·028	16·124
14·	26·458	25·100	23·664	22·136	20·494	18·708	16·734
15·	27·394	25·981	24·495	22·913	21·213	19·365	17·320
16·	28·284	26·833	25·298	23·664	21·909	20·	17·888
20·	31·623	30·	28·284	26·458	24·495	22·361	20·

TABLE III.

$100\sqrt{RS}$, suitable to Canals and Channels,

of R and S per thousand.

R	S per thousand. 1·5	1·0	0·95	0·90	0·85	0·80	0·75
1·	3·873	3·162	3·082	3·	2·915	2·828	2·738
1·25	4·330	3·536	3·446	3·354	3·259	3·162	3·062
1·5	4·743	3·873	3·775	3·674	3·571	3·464	3·354
1·75	5·123	4·183	4·077	3·969	3·857	3·742	3·623
2·	5·476	4·472	4·359	4·243	4·123	4.	3·873
2·25	5·809	4·743	4·623	4·5	4·373	4·242	4·108
2·5	6·123	5·	4·873	4·743	4·610	4·472	4·330
2·75	6·423	5·244	5·111	4·975	4·835	4·690	4·542
3·	6·708	5·477	5·339	5·196	5·050	4·898	4·743
3·25	6·982	5·701	5·556	5·408	5·256	5·098	4.937
3·5	7·246	5·916	5·766	5·612	5·454	5·292	5·123
3·75	7·5	6·124	5·969	5·809	5·646	5·477	5·303
4·	7·746	6·325	6·164	6·	5·831	5·657	5·476
4·25	7·984	6·519	6·354	6·185	6·010	5·830	5·646
4·5	8·216	6·708	6·538	6·364	6·185	6·	5·809
4·75	8·441	6·892	6·718	6·538	6·354	6·164	5·969
5·	8·660	7·071	6·892	6·708	6·519	6·325	6·123
5·25	8·874	7·246	7·062	6·874	6·680	6·482	6·275
5·5	9·083	7·416	7·228	7·036	6·827	6·633	6·423
5·75	9·287	7·583	7·391	7·194	6·991	6·782	6·567
6·	9·487	7·746	7·550	7·348	7·141	6·928	6·708
6·5	9·874	8·062	7·858	7·649	7·433	7·211	6·982
7·	10·247	8·367	8·155	7·937	7·714	7·484	7·246
7·5	10·611	8·660	8·441	8·216	7·984	7·746	7·5
8·	10·954	8·944	8·718	8·485	8·246	8·	7·746
8·5	11·292	9·220	8·986	8·746	8·500	8·246	7·984
9·	11·619	9·487	9·247	9·	8·746	8·486	8·216
10·	12·247	10·	9·747	9·487	9·220	8·944	8·660
11·	12·845	10·488	10·223	9·950	9·670	9·381	9·083
12·	13·416	10·954	10·677	10·392	10·100	9·797	9·487
13·	13·964	11·402	11·113	10·817	10·512	10·198	9·874
14·	14·491	11·832	11·533	11·225	10·909	10·583	10·247
15·	15·	12·247	11·938	11·619	11·292	10·954	10·611
16·	15·492	12·649	12·329	12·	11·662	11·314	10·954
20·	17·321	14·142	13·784	13·416	13·038	12·650	12·247

TABLE III.

VALUES OF THE EXPRESSION

Corresponding to values

R	S per thousand. 0·70	0·65	0·60	0·55	0·50	0·45	0·40
1·	2·646	2·550	2·449	2·345	2·236	2·121	2·
1·25	2·958	2·850	2·739	2·622	2·5	2·372	2·236
1·5	3·240	3·122	3·	2·872	2·739	2·598	2·449
1·75	3·500	3·372	3·240	3·102	2·958	2·806	2·646
2·	3·742	3·606	3·464	3·317	3·162	3·	2·828
2·25	3·969	3·824	3·674	3·518	3·354	3·182	3·
2·5	4·183	4·031	3·873	3·708	3·536	3·354	3·162
2·75	4·387	4·228	4·062	3·889	3·708	3·518	3·317
3·	4·583	4·416	4·243	4·062	3·873	3·674	3·464
3·25	4·770	4·596	4·416	4·228	4·031	3·824	3·606
3·5	4·950	4·769	4·583	4·387	4·183	3·969	3·742
3·75	5·123	4·937	4·743	4·541	4·330	4·108	3·873
4·	5·292	5·099	4·899	4·690	4·472	4·243	4·
4·25	5·454	5·256	5·050	4·835	4·610	4·373	4·124
4·5	5·612	5·408	5·196	4·975	4·743	4·5	4·243
4·75	5·766	5·557	5·339	5·111	4·873	4·623	4·358
5·	5·916	5·701	5·477	5·244	5·	4·743	4·472
5·25	6·062	5·842	5·612	5·374	5·123	4·861	4·582
5·5	6·205	5·979	5·744	5·500	5·244	4·975	4·690
5·75	6·344	6·114	5·874	5·624	5·362	5·087	4·796
6·	6·481	6·245	6·	5·745	5·477	5·196	4·898
6·5	6·745	6·5	6·245	5·979	5·701	5·408	5·098
7·	7·	6·745	6·480	6·205	5·916	5·612	5·292
7·5	7·246	6·982	6·708	6·423	6·124	5·809	5·477
8·	7·483	7·211	6·928	6·633	6·325	6·	5·657
8·5	7·714	7·433	7·141	6·837	6·519	6·185	5·830
9·	7·937	7·649	7·348	7·036	6·708	6·364	6·
10·	8·367	8·062	7·746	7·416	7·071	6·708	6·325
11·	8·775	8·456	8·124	7·778	7·416	7·036	6·633
12·	9·165	8·832	8·486	8·124	7·746	7·348	6·928
13·	9·539	9·192	8·832	8·456	8·062	7·649	7·211
14·	9·899	9·539	9·165	8·775	8·367	7·937	7·484
15·	10·247	9·874	9·486	9·083	8·660	8·216	7·746
16·	10·583	10·198	9·798	9·381	8·944	8·485	8·
20·	11·832	11·402	10·954	10·488	10·	9·487	8·944

TABLE III.

$100\sqrt{RS}$, suitable to Canals and Channels,

of R and S per thousand.

R	S per thousand. 0·35	0·30	0·25	0·20	0·15	0·10	0·05
1·	1·871	1·732	1·581	1·414	1·225	1·	0·707
1·25	2·092	1·936	1·767	1·581	1·369	1·118	0·790
1·5	2·291	2·121	1·936	1·732	1·5	1·225	0·866
1·75	2·475	2·291	2·092	1·871	1·620	1·323	0·935
2·	2·646	2·449	2·236	2·	1·732	1·414	1·
2·25	2·806	2·598	2·371	2·121	1·837	1·5	1·060
2·5	2·958	2·739	2·5	2·236	1·936	1·581	1·118
2·75	3·102	2·872	2·622	2·345	2·031	1·658	1·172
3·	3·240	3·	2·739	2·449	2·121	1·732	1·225
3·25	3·373	3·122	2·850	2·549	2·208	1·803	1·275
3·5	3·5	3·240	2·958	2·646	2·291	1·871	1·323
3·75	3·623	3·354	3·062	2·738	2·371	1·937	1·369
4·	3·742	3·464	3·162	2·828	2·449	2·	1·414
4·25	3·857	3·571	3·259	2·915	2·525	2·062	1·458
4·5	3·969	3·674	3·354	3·	2·598	2·121	1·5
4·75	4·077	3·775	3·446	3·082	2·669	2·179	1·541
5·	4·183	3·873	3·536	3·162	2·739	2·236	1·581
5·25	4·287	3·969	3·623	3·241	2·806	2·291	1·620
5·5	4·387	4·062	3·708	3·317	2·872	2·345	1·658
5·75	4·486	4·153	3·791	3·391	2·937	2·398	1·696
6·	4·583	4·243	3·873	3·464	3·	2·449	1·732
6·5	4·770	4·416	4·031	3·606	3·122	2·549	1·803
7·	4·950	4·583	4·183	3·742	3·240	2·646	1·871
7·5	5·123	4·743	4·330	3·873	3·354	2·738	1·937
8·	5·292	4·899	4·472	4·	3·464	2·828	2·
8·5	5·454	5·050	4·610	4·124	3·571	2·915	2·062
9·	5·612	5·196	4·743	4·243	3·674	3·	2·121
10·	5·916	5·477	5·	4·472	3·873	3·162	2·236
11·	6·205	5·744	5·244	4·690	4·062	3·317	2·345
12·	6·481	6·	5·477	4·898	4·243	3·464	2·449
13·	6·745	6·245	5·701	5·098	4·416	3·606	2·549
14·	7·	6·480	5·916	5·292	4·583	3·742	2·646
15·	7·246	6·708	6·124	5·477	4·743	3·873	2·738
16·	7·483	6·928	6·325	5·657	4·899	4·	2·828
20·	8·367	7·746	7·071	6·325	5·477	4·472	3·162

TABLE IV.

SECTIONAL DATA.

Sectional Areas (A) and Hydraulic Radii (R),

1. For Cylindrical and Ovoidal Pipes and Culverts.

2. For Rectangular and Trapezoidal Canal Sections.

for use in the General Formulæ,

$$Q = A \, . \, C \, . \, 100\sqrt{RS},$$

$$V = C \, . \, 100\sqrt{RS}.$$

This Table may be used with any unit of measurement.

TABLE IV.

SECTIONAL AREAS (A) AND HYDRAULIC

Cylindrical Culverts and Pipes.

Diameter.	Full.		Two-thirds full.		One-third full.	
	A	R	A	R	A	R
3 inches	0·0491	0·0625	0·0347	0·073	0·0143	0·046
4 "	0·0872	0·0833	0·0618	0·097	0·0254	0·062
6 "	0·1963	0·125	0·1390	0·145	0·0573	0·093
8 "	0·3490	0·1666	0·2472	0·194	0·1018	0·124
9 "	0·4418	0·1875	0·3128	0·218	0·1289	0·140
10 "	0·5454	0·2083	0·3807	0·243	0·1592	0·155
Feet.						
1·	0·7854	0·25	0·5562	0·291	0·2292	0·186
1·25	1·2272	0·3125	0·8565	0·364	0·3581	0·233
1·5	1·7671	0·375	1·2514	0·436	0·5157	0·280
1·75	2·4053	0·4375	1·6409	0·509	0·7019	0·326
2·	3·1416	0·5	2·2248	0·582	0·9168	0·372
2·25	3·9760	0·5625	2·8157	0·655	1·1609	0·419
2·5	4·9087	0·625	3·4262	0·728	1·4325	0·465
2·75	5·9395	0·6875	4·2062	0·800	1·7333	0·512
3·	7·0686	0·75	5·0058	0·873	2·0628	0·559
3·25	8·2957	0·8125	5·8747	0·996	2·4209	0·605
3·5	9·6211	0·875	6·5635	1·019	2·8077	0·652
3·75	11·045	0·9375	7·8215	1·092	3·2230	0·698
4·	12·566	1·	8·8992	1·164	3·6672	0·744
4·5	15·904	1·125	11·263	1·310	4·6437	0·838
5·	19·635	1·25	13·905	1·455	5·7300	0·931
5·5	23·758	1·375	16·825	1·601	6·9333	1·024
6·	28·274	1·5	20·023	1·747	8·2512	1·117
6·5	33·183	1·625	23·499	1·992	9·6837	1·210
7·	38·485	1·75	27·254	2·038	11·231	1·303
7·5	44·179	1·875	31·286	2·183	12·892	1·396
8·	50·265	2·	35·597	2·329	14·669	1·490
8·5	56·745	2·125	40·185	2·475	16·560	1·583
9·	63·617	2·25	45·052	2·620	18·565	1·676
9·5	70·882	2·375	50·197	2·765	20·685	1·769
10·	78·540	2·5	55·620	2·911	22·920	1·862

The values of R for cylindrical culverts half full are the same as those for full cylindrical culverts of the same diameter.

TABLE IV.

Radii (R) in Feet, for Culverts and Pipes.

Hawksley's Ovoid Culvert.

Transverse Diameter.	Full. A	Full. R	Two-thirds full. A	Two-thirds full. R	One-third full. A	One-third full. R
1′ 0″	0·9955	0·2766	0·6714	0·310	0·2569	0·198
1′ 2″	1·3550	0·3227	0·9138	0·362	0·3496	0·231
1′ 4″	1·7697	0·3688	1·1936	0·413	0·4566	0·264
1′ 6″	2·2424	0·4149	1·5106	0·465	0·5780	0·297
1′ 8″	2·7653	0·4610	1·8650	0·517	0·7136	0·330
1′ 10″	3·3457	0·5071	2·2506	0·568	0·8627	0·363
2′ 0″	3·9820	0·5532	2·6856	0·620	1·0276	0·396
2′ 2″	4·6728	0·5993	3·1434	0·672	1·2050	0·439
2′ 4″	5·4199	0·6454	3·6554	0·723	1·3985	0·472
2′ 6″	6·2219	0·6915	4·1962	0·775	1·6054	0·495
2′ 8″	7·0790	0·7376	4·7744	0·826	1·8265	0·528
2′ 10″	7·8908	0·7837	5·3754	0·878	2·0606	0·561
3′ 0″	8·9695	0·8298	6·0426	0·930	2·3121	0·594
3′ 2″	9·9822	0·8759	6·7324	0·981	2·5760	0·627
3′ 4″	11·061	0·9220	7·4600	1·033	2·8544	0·660
3′ 6″	12·195	0·9681	8·2242	1·085	3·1464	0·693
3′ 8″	13·383	1·0142	9·0024	1·136	3·4508	0·726
3′ 10″	14·628	1·0603	9·8657	1·188	3·7749	0·759
4′ 0″	15·928	1·1064	10·742	1·240	4·1104	0·792
4′ 2″	17·282	1·1525	11·656	1·291	4·4600	0·825
4′ 4″	18·691	1·1986	12·574	1·343	4·8200	0·858
4′ 6″	20·182	1·2447	13·595	1·395	5·2020	0·891
4′ 8″	21·680	1·2908	14·622	1·446	5·5942	0·924
4′ 10″	23·253	1·3369	15·683	1·498	6·0006	0·957
5′ 0″	24·887	1·3830	16·785	1·550	6·4225	0·990
5′ 2″	26·567	1·4291	17·918	1·601	6·8560	1·023
5′ 4″	28·316	1·4752	19·098	1·653	7·3062	1·056
5′ 6″	30·111	1·5213	20·255	1·705	7·7643	1·089
5′ 8″	31·563	1·5674	51·502	1·756	8·2424	1·122
5′ 10″	33·871	1·6135	22·844	1·808	8·7407	1·155
6′ 0″	35·838	1·6596	24·170	1·859	9·2484	1·188

The long diameter = 1·2929 × transverse diameter in Hawksley's Ovoid.

TABLE IV.

SECTIONAL AREAS (A) AND HYDRAULIC

Phillips Metropolitan Ovoid.

Dimensions.	Full.		Two-thirds full.		One-third full.	
	A	R	A	R	A	R
1′ 0″ × 1′ 6″	1·1485	0·290	0·7558	0·316	0·2840	0·207
1′ 2″ × 1′ 9″	1·1563	0·338	1·0287	0·368	0·3865	0·241
1′ 4″ × 2′ 0″	2·0418	0·386	1·3436	0·421	0·5049	0·276
1′ 6″ × 2′ 3″	2·5841	0·434	1·7005	0·474	0·6390	0·310
1′ 8″ × 2′ 6″	3·1903	0·483	2·0994	0·526	0·7889	0·344
1′ 10″ × 2′ 9″	3·8602	0·531	2·5402	0·579	0·9545	0·379
2′ 0″ × 3′ 0″	4·5940	0·579	3·0232	0·631	1·1360	0·413
2′ 2″ × 3′ 3″	5·3916	0·628	3·5480	0·684	1·3332	0·448
2′ 4″ × 3′ 6″	6·2529	0·676	4·1149	0·737	1·5462	0·482
2′ 6″ × 3′ 9″	7·1781	0·724	4·7237	0·789	1·7750	0·517
2′ 8″ × 4′ 0″	8·1671	0·773	5·3746	0·842	2·0195	0·541
2′ 10″ × 4′ 3″	9·2199	0·821	6·0674	0·894	2·2799	0·585
3′ 0″ × 4′ 6″	10·336	0·869	6·8022	0·947	2·5560	0·620
3′ 2″ × 4′ 9″	11·517	0·917	7·5790	1·	2·8479	0·654
3′ 4″ × 5′ 0″	12·761	0·966	8·3978	1·052	3·1556	0·689
3′ 6″ × 5′ 3″	14·069	1·014	9·2585	1·105	3·4790	0·723
3′ 8″ × 5′ 6″	15·410	1·062	10·161	1·158	3·8182	0·758
3′ 10″ × 5′ 9″	16·877	1·111	11·106	1·210	4·1732	0·792
4′ 0″ × 6′ 0″	18·376	1·159	12·093	1·263	4·5440	0·826
4′ 2″ × 6′ 3″	19·939	1·207	13·122	1·315	4·9306	0·861
4′ 4″ × 6′ 6″	21·566	1·255	14·192	1·368	5·3329	0·895
4′ 6″ × 6′ 9″	23·257	1·304	15·305	1·421	5·7510	0·930
4′ 8″ × 7′ 0″	25·012	1·352	16·460	1·473	6·1849	0·964
4′ 10″ × 7′ 3″	26·830	1·400	17·656	1·526	6·6346	0·999
5′ 0″ × 7′ 6″	28·713	1·449	18·895	1·579	7·1000	1·033
5′ 2″ × 7′ 9″	30·665	1·467	20·176	1·631	7·5812	1·068
5′ 4″ × 8′ 0″	32·668	1·545	21·498	1·684	8·0782	1·102
5′ 6″ × 8′ 3″	34·742	1·593	22·863	1·736	8·5910	1·136
5′ 8″ × 8′ 6″	36·880	1·642	24·270	1·789	9·1196	1·171
5′ 10″ × 8′ 9″	39·081	1·690	25·718	1·842	9·6639	1·205
6′ 0″ × 9′ 0″	41·346	1·738	27·209	1·894	10·224	1·240

TABLE IV.

Radii (R) in Feet, for Culverts.

Jackson's Pegtop Section.

Dimensions.	Full.		Two-thirds full.		One-third full.	
	A	R	A	R	A	R
1′ 0″ × 1′ 6″	1·0385	0·268	0·6458	0·280	0·2422	0·190
1′ 2″ × 1′ 9″	1·4136	0·312	0·8790	0·326	0·3296	0·222
1′ 4″ × 2′ 0″	1·8463	0·357	1·1482	0·373	0·4305	0·254
1′ 6″ × 2′ 3″	2·3367	0·402	1·4531	0·420	0·5448	0·286
1′ 8″ × 2′ 6″	2·8848	0·447	1·7929	0·466	0·6504	0·317
1′ 10″ × 2′ 9″	3·4906	0·492	2·1152	0·513	0·8134	0·349
2′ 0″ × 3′ 0″	4·1542	0·536	2·5834	0·560	0·9686	0·381
2′ 2″ × 3′ 3″	4·8735	0·580	3·0317	0·606	1·1355	0·412
2′ 4″ × 3′ 6″	5·6542	0·624	3·5162	0·653	1·3186	0·444
2′ 6″ × 3′ 9″	6·4909	0·669	4·0340	0·699	1·5134	0·476
2′ 8″ × 4′ 0″	7·3851	0·714	4·5928	0·746	1·7220	0·508
2′ 10″ × 4′ 3″	8·3371	0·769	5·1843	0·793	1·9425	0·539
3′ 0″ × 4′ 6″	9·3469	0·803	5·8126	0·839	2·1794	0·571
3′ 2″ × 4′ 9″	10·414	0·848	6·4776	0·886	2·4265	0·603
3′ 4″ × 5′ 0″	11·539	0·893	7·1716	0·933	2·6016	0·634
3′ 6″ × 5′ 3″	12·722	0·937	7·9115	0·979	2·9668	0·666
3′ 8″ × 5′ 6″	13·963	0·982	8·4608	1·026	3·2536	0·698
3′ 10″ × 5′ 9″	15·261	1·027	9·4922	1·072	3·5558	0·730
4′ 0″ × 6′ 0″	16·617	1·071	10·334	1·119	3·8744	0·761
4′ 2″ × 6′ 3″	18·030	1·115	11·215	1·165	4·2011	0·793
4′ 4″ × 6′ 6″	19·501	1·160	12·127	1·212	4·5420	0·825
4′ 6″ × 6′ 9″	21·030	1·205	13·078	1·259	4·9032	0·856
4′ 8″ × 7′ 0″	22·617	1·249	14·065	1·305	5·2744	0·888
4′ 10″ × 7′ 3″	24·261	1·294	15·091	1·352	5·6529	0·920
5′ 0″ × 7′ 6″	25·964	1·339	16·136	1·399	6·0538	0·952
5′ 2″ × 7′ 9″	27·723	1·384	17·244	1·445	6·4595	0·983
5′ 4″ × 8′ 0″	29·540	1·428	18·371	1·492	6·8440	1·015
5′ 6″ × 8′ 3″	31·416	1·472	19·537	1·539	7·3206	1·047
5′ 8″ × 8′ 6″	33·348	1·517	20·737	1·585	7·7700	1·078
5′ 10″ × 8′ 9″	35·339	1·562	21·981	1·632	8·2340	1·110
6′ 0″ × 9′ 0″	37·388	1·607	23·250	1·679	8·7175	1·142

TABLE IV.

Sectional Areas (A) and Hydraulic Radii (R), for Rect-

Corresponding to various bed-

d	b=2		b=3		b=4		b=5	
—	A	R	A	R	A	R	A	R
0·5	1·	0·333	1·5	0·375	2	0·4	2·5	0·416
0·75	1·5	0·429	2·25	0·5	3	0·545	3·75	0·577
1·	2·	0·5	3·	0·6	4	0·666	5·	0·714
1·25	2·5	0·555	3·75	0·682	5	0·769	6·25	0·833
1·5	3·	0·600	4·5	0·750	6	0·857	7·5	0·937
1·75	3·5	0·636	5·25	0·808	7	0·933	8·75	1·029
2·	4·	0·666	6·	0·857	8	1·	10·	1·111
2·25	4·5	0·692	6·75	0·9	9	1·058	11·25	1·184
2·5	5·	0·714	7·5	0·937	10	1·111	12·5	1·250
2·75	5·5	0·733	8·25	0·971	11	1·158	13·75	1·309
3·	6·	0·750	9·	1·	12	1·200	15·	1·364
3·5	7·	0·777	10·5	1·050	14	1·273	17·25	1·439
4·	8·	0·800	12·	1·091	16	1·333	20·	1·538
4·5	9·	0·818	13·5	1·125	18	1·384	22·5	1·607
5·	10·	0·833	15·	1·154	20	1·428	25·	1·666

d	b=14		b=16		b=18		b=20	
—	A	R	A	R	A	R	A	R
1·	14·	0·875	16	0·888	18	0·900	20	0·909
1·25	17·5	1·061	20	1·080	22·5	1·098	25	1·111
1·5	21·	1·244	24	1·262	27	1·286	30	1·305
1·75	24·5	1·397	28	1·434	31·5	1·468	35	1·491
2·	28·	1·555	32	1·600	36	1·636	40	1·666
2·25	31·5	1·701	36	1·757	40·5	1·800	45	1·836
2·5	35·	1·841	40	1·904	45	1·953	50	2·
2·75	38·5	1·971	44	2·050	49·5	2·109	55	2·156
3·	42·	2·100	48	2·182	54	2·250	60	2·307
3·25	45·5	2·230	52	2·311	58·5	2·387	65	2·457
3·5	49·	2·333	56	2·346	63	2·520	70	2·590
3·75	52·5	2·447	60	2·556	67·5	2·646	75	2·727
4·	56·	2·545	64	2·666	72	2·768	80	2·857
4·25	59·5	2·644	68	2·774	76·5	2·892	85	2·975
4·5	63·	2·741	72	2·880	81	3·	90	3·105
4·75	66·5	2·833	76	2·979	85·5	3·109	95	3·211
5·	70·	2·917	80	3·080	90	3·214	100	3·333
5·5	77·	3·080	88	3·256	99	3·416	110	3·553
6·	84·	3·230	96	3·429	108	3·600	120	3·750
6·5	91·	3·367	104	3·588	117	3·779	130	3·939
7·	98·	3·500	112	3·733	126	3·938	140	4·116

TABLE IV.

ANGULAR SECTIONS OF CHANNELS, CANALS, AND AQUEDUCTS,

widths (b) and depths of water (d).

d	$b=6$ A	$b=6$ R	$b=8$ A	$b=8$ R	$b=10$ A	$b=10$ R	$b=12$ A	$b=12$ R
1·0	6·	0·750	8	0·800	10·	0·833	12	0·857
1·25	7·5	0·882	9	0·857	12·5	1·	15	1·035
1·5	9·	1·	12	1·091	15·	1·154	18	1·200
1·75	10·5	1·106	14	1·218	17·5	1·295	21	1·357
2·	12·	1·200	16	1·333	20·	1·429	24	1·5
2·25	13·5	1·286	18	1·440	22·5	1·553	27	1·636
2·5	15·	1·364	20	1·538	25·	1·666	30	1·764
2·75	16·5	1·436	22	1·628	27·5	1·777	33	1·887
3·	18·	1·5	24	1·714	30·	1·875	36	2·
3·25	19·5	1·560	26	1·794	32·5	1·970	39	2·106
3·5	21·	1·615	28	1·866	35·	2·058	42	2·209
3·75	22·5	1·666	30	1·938	37·5	2·143	45	2·304
4·	24·	1·714	32	2·	40·	2·222	48	2·4
4·5	27·	1·800	36	2·117	45·	2·367	54	2·571
5·	30·	1·875	40	2·222	50·	2·500	60	2·727

d	$b=25$ A	$b=25$ R	$b=30$ A	$b=30$ R	$b=35$ A	$b=35$ R	$b=40$ A	$b=40$ R
1·	25·	0·925	30	0·938	35·	0·945	40	0·952
1·5	37·5	1·338	45	1·364	52·5	1·382	60	1·398
2·	50·	1·725	60	1·764	70·	1·792	80	1·818
2·25	56·25	1·901	67·5	1·957	78·75	1·994	90	2·023
2·5	62·5	2·083	75·	2·143	87·5	2·187	100	2·222
2·75	68·75	2·255	82·5	2·326	96·25	2·377	110	2·418
3·	75·	2·422	90	2·500	105·	2·562	120	2·610
3·25	81·25	2·579	97·5	2·672	113·75	2·741	130	2·795
3·5	87·5	2·734	105	2·835	122·5	2·919	140	2·982
3·75	93·75	2·884	112·5	3·	131·25	3·071	150	3·099
4·	100·	3·030	120	3·156	140·	3·162	160	3·333
4·25	106·25	3·166	127·5	3·312	148·75	3·421	170	3·505
4·5	112·5	3·308	135	3·456	157·5	3·579	180	3·672
4·75	118·75	3·327	142·5	3·608	166·25	3·737	190	3·838
5·	125·	3·571	150	3·750	175·	3·944	200	4·
5·5	137·5	3·820	165	4·026	192·5	4·177	220	4·314
6·	150·	4·050	180	4·286	210·	4·473	240	4·614
6·5	162·5	4·274	195	4·544	227·5	4·739	260	4·906
7·	175·	4·480	210	4·773	245·	5·	280	5·180
7·5	187·5	4·687	225	5·	262·5	5·250	300	5·455
8·	200·	4·880	240	5·220	280·	5·491	320	5·714

TABLE IV.

SECTIONAL AREAS (A) AND HYDRAULIC RADII (R), FOR RECT-

Corresponding to different bed-

d	b=50		b=60		b=70		b=80	
	A	R	A	R	A	R	A	R
1·0	50·	0·962	60	0·968	70·	0·972	80	0·976
2·0	100·	1·852	120	1·875	140·	1·892	160	1·905
2·25	112·5	2·063	135	2·093	157·5	2·114	180	2·130
2·5	125·	2·273	150	2·308	175·	2·333	200	2·353
2·75	137·5	2·477	165	2·519	192·5	2·549	220	2·573
3·	150·	2·679	180	2·727	210·	2·764	240	2·791
3·25	162·5	2·876	195	2·932	227·5	2·975	260	3·006
3·5	175·	3·069	210	3·134	245·	3·182	280	3·217
3·75	187·5	3·261	225	3·333	262·5	3·387	300	3·427
4·	200·	3·448	240	3·529	280·	3·590	320	3·636
4·25	212·5	3·632	255	3·722	297·5	3·790	340	3·842
4·5	225·	3·814	270	3·913	315·	3·988	360	4·046
4·75	237·5	3·991	285	4·101	332·5	4·182	380	4·245
5·	250·	4·167	300	4·286	350·	4·375	400	4·444
5·25	262·5	4·339	315	4·468	367·5	4·565	420	4·641
5·5	275·	4·507	330	4·646	385·	4·753	440	4·836
5·75	287·5	4·675	345	4·825	402·5	4·939	460	5·027
6·	300·	4·839	360	5·	420·	5·122	480	5·217
6·25	312·5	5·	375	5·172	437·5	5·302	500	5·405
6·5	325·	5·158	390	5·343	455·	5·483	520	5·590
6·75	337·5	5·315	405	5·510	472·5	5·659	540	5·775
7·	350·	5·470	420	5·676	490·	5·833	560	5·958
7·25	362·5	5·620	435	5·839	507·5	6·006	580	6·138
7·5	375·	5·767	450	6·	525·	6·176	600	6·315
7·75	387·5	5·916	465	6·158	542·5	6·345	620	6·493
8·	400·	6·060	480	6·316	560·	6·513	640	6·666
8·25	412·5	6·103	495	6·471	577·5	6·676	660	6·839
8·5	425·	6·345	510	6·624	595·	6·842	680	7·004
8·75	437·5	6·481	525	6·775	612·5	7·	700	7·179
9·	450·	6·619	540	6·923	630·	7·160	720	7·344
9·25	462·5	6·752	555	7·010	647·5	7·317	740	7·512
9·5	475·	6·883	570	7·216	665·	7·475	760	7·676
9·75	487·5	7·014	585	7·358	682·5	7·626	780	7·839
10·	500·	7·145	600	7·500	700·	7·777	800	8·000
11·	550·	9·014	660	8·048	770·	8·370	880	8·624
12·	600·	9·678	720	8·571	840·	8·938	960	9·230

TABLE IV.

ANGULAR SECTIONS OF CHANNELS, CANALS, AND AQUEDUCTS.

widths (b) and depths of water (d).

d	$b=90$		$b=100$		$b=120$		$b=140$	
—	A	R	A	R	A	R	A	R
1·0	90·	0·978	100	0·980	120	0·984	140	0·986
2·0	180·	1·915	200	1·923	240	1·936	280	1·944
2·25	202·5	2·143	225	2·153	270	2·169	315	2·180
2·5	225·	2·369	250	2·381	300	2·400	350	2·414
2·75	247·5	2·592	275	2·606	330	2·629	385	2·646
3·	270·	2·813	300	2·830	360	2·857	420	2·877
3·25	292·5	3·031	325	3·052	390	3·083	455	3·106
3·5	315·	3·245	350	3·271	420	3·307	490	3·333
3·75	337·5	3·461	375	3·488	450	3·529	525	3·560
4·	360·	3·672	400	3·704	480	3·750	560	3·784
4·25	382·5	3·883	425	3·917	510	3·969	595	4·007
4·5	405·	4·091	450	4·128	540	4·186	630	4·228
4·75	427·5	4·296	475	4·338	570	4·402	665	4·448
5·	450·	4·500	500	4·545	600	4·615	700	4·667
5·25	472·5	4·701	525	4·751	630	4·828	735	4·883
5·5	495·	4·900	550	4·955	660	5·038	770	5·100
5·75	517·5	5·098	575	5·157	690	5·247	805	5·313
6·	540·	5·292	600	5·357	720	5·455	840	5·527
6·25	562·5	5·488	625	5·555	750	5·659	875	5·738
6·5	585·	5·679	650	5·752	780	5·865	910	5·948
6·75	607·5	5·870	675	5·947	810	6·068	945	6·156
7·	630·	6·057	700	6·140	840	6·269	980	6·364
7·25	652·5	6·244	725	6·332	870	6·468	1015	6·569
7·5	675·	6·429	750	6·522	900	6·667	1050	6·775
7·75	697·5	6·611	775	6·720	930	6·863	1085	6·977
8·	720·	6·792	800	6·897	960	7·059	1120	7·179
8·25	742·5	6·972	825	7·082	990	7·253	1155	7·380
8·5	765·	7·150	850	7·265	1020	7·445	1190	7·579
8·75	787·5	7·325	875	7·445	1050	7·637	1225	7·778
9·	810·	7·505	900	7·627	1080	7·826	1260	7·976
9·25	832·5	7·672	925	7·805	1100	7·942	1295	8·171
9·5	855·	7·844	950	7·983	1130	8·129	1330	8·364
9·75	877·5	8·013	975	8·159	1160	8·315	1365	8·559
10·	900·	8·182	1000	8·333	1190	8·500	1400	8·750
11·	990·	8·839	1100	9·017	1320	9·295	1540	9·510
12·	1080·	9·472	1200	9·677	1440	10·	1680	10·244

TABLE IV.

SECTIONAL AREAS (A) AND HYDRAULIC RADII (R), FOR RECT-

Corresponding to various bed-

d	b=160		b=180		b=200		b=220	
—	A	R	A	R	A	R	A	R
1·0	160	0·987	180	0·989	200	0·990	220	0·991
2·0	320	1·951	360	1·956	400	1·961	440	1·965
2·25	360	2·188	405	2·195	450	2·201	495	2·205
2·5	400	2·424	450	2·432	500	2·439	550	2·444
2·75	440	2·658	495	2·668	550	2·676	605	2·683
3·	480	2·891	540	2·903	600	2·913	660	2·921
3·25	520	3·123	585	3·137	650	3·148	715	3·157
3·5	560	3·353	630	3·369	700	3·382	770	3·392
3·75	600	3·582	675	3·599	750	3·614	825	3·627
4·	640	3·809	720	3·830	800	3·846	880	3·860
4·25	680	4·036	765	4·059	850	4·077	935	4·092
4·5	720	4·260	810	4·285	900	4·306	990	4·323
4·75	760	4·484	855	4·513	950	4·534	1045	4·554
5·	800	4·706	900	4·737	1000	4·762	1100	4·783
5·25	840	4·927	945	4·961	1050	4·989	1155	5·010
5·5	880	5·146	990	5·184	1100	5·213	1210	5·238
5·75	920	5·365	1035	5·405	1150	5·437	1265	5·465
6·	960	5·581	1080	5·625	1200	5·660	1320	5·689
6·25	1000	5·797	1125	5·843	1250	5·883	1375	5·913
6·5	1040	6·011	1170	6·062	1300	6·104	1430	6·138
6·75	1080	6·225	1215	6·279	1350	6·323	1485	6·359
7·	1120	6·437	1260	6·495	1400	6·542	1540	6·582
7·25	1160	6·648	1305	6·710	1450	6·760	1595	6·801
7·5	1200	6·857	1350	6·923	1500	6·977	1650	7·021
7·75	1240	7·057	1395	7·134	1550	7·192	1705	7·239
8·	1280	7·273	1440	7·348	1600	7·408	1760	7·457
8·5	1360	7·684	1530	7·766	1700	7·834	1870	7·890
9·	1440	8·090	1620	8·182	1800	8·257	1980	8·319
9·5	1520	8·492	1710	8·593	1900	8·675	2090	8·745
10·	1600	8·888	1800	9·	2000	9·091	2200	9·167
11·	1760	9·167	1980	9·801	2200	9·910	2420	10·
12·	1920	10·435	2160	10·588	2400	10·715	2640	10·820
13·	2080	11·183	2340	11·359	2600	11·505	2860	11·626
14·	2240	11·915	2520	12·115	2800	12·280	3080	12·419
15·	2400	12·632	2700	12·857	3000	13·043	3300	13·200
16·	2560	13·333	2880	13·585	3200	13·793	3520	13·968

TABLE IV.

ANGULAR SECTIONS OF CHANNELS, CANALS, AND AQUEDUCTS.

widths (*b*) and depths of water (*d*).

d	b=240		b=260		b=280		b=300	
—	A	R	A	R	A	R	A	R
2·0	480	1·967	520	1·969	560	1·971	600	1·974
2·5	600	2·449	650	2·453	700	2·456	750	2·459
3·	720	2·927	780	2·932	840	2·937	900	2·941
3·25	780	3·164	845	3·170	910	3·176	975	3·181
3·5	840	3·401	910	3·408	980	3·414	1050	3·420
3·75	900	3·636	975	3·645	1050	3·652	1125	3·659
4·	960	3·871	1040	3·880	1120	3·889	1200	3·896
4·25	1020	4·104	1105	4·115	1190	4·125	1275	4·132
4·5	1080	4·337	1170	4·349	1260	4·360	1350	4·369
4·75	1140	4·569	1235	4·582	1330	4·594	1425	4·604
5·	1200	4·800	1300	4·815	1400	4·827	1500	4·839
5·25	1260	5·030	1365	5·045	1470	5·060	1575	5·073
5·5	1320	5·259	1430	5·277	1540	5·291	1650	5·305
5·75	1380	5·487	1495	5·508	1610	5·522	1725	5·537
6·	1440	5·604	1560	5·735	1680	5·754	1800	5·769
6·25	1500	5·940	1625	5·963	1750	5·983	1875	6·
6·5	1560	6·167	1690	6·192	1820	6·212	1950	6·230
6·75	1620	6·391	1755	6·416	1890	6·439	2025	6·460
7·	1680	6·614	1820	6·643	1960	6·666	2100	6·689
7·25	1740	6·836	1885	6·869	2030	6·894	2175	6·916
7·5	1800	7·060	1950	7·090	2100	7·119	2250	7·144
7·75	1860	7·274	2015	7·314	2170	7·343	2325	7·370
8·	1920	7·500	2080	7·536	2240	7·567	2400	7·596
8·5	2040	7·938	2210	7·978	2380	8·013	2550	8·055
9·	2160	8·372	2340	8·417	2520	8·457	2700	8·492
9·5	2280	8·803	2470	8·852	2660	8·895	2850	8·935
10·	2400	9·230	2600	9·286	2800	9·333	3000	9·375
10·5	2520	9·654	2730	9·716	2940	9·767	3150	9·807
11·	2640	10·076	2860	10·142	3080	10·198	3300	10·250
11·5	2760	10·494	2990	10·565	3220	10·627	3450	10·681
12·	2880	10·909	3120	10·986	3360	11·052	3600	11·111
12·5	3000	11·321	3250	11·404	3500	11·475	3750	11·538
13·	3120	11·728	3380	11·818	3640	11·895	3900	11·961
14·	3360	12·536	3640	12·639	3920	12·727	4200	12·793
15·	3600	13·333	3900	13·448	4200	13·549	4500	13·635
16·	3840	14·116	4160	14·247	4480	14·359	4800	14·458
20·	4800	17·143	5200	17·333	5600	17·500	6000	17·646

TABLE IV.

SECTIONAL AREAS (A) AND HYDRAULIC RADII (R), FOR TRA-

Corresponding to different bed-

d	b=2		b=3		b=4		b=5	
—	A	R	A	R	A	R	A	R
0·5	1·25	0·366	1·75	0·396	2·25	0·416	2·75	0·429
0·75	2·06	0·500	2·81	0·549	3·56	0·582	4·31	0·607
1·	3·	0·621	4·	0·686	5·	0·732	6·	0·766
1·25	4·06	0·734	5·31	0·812	6·56	0·871	7·81	0·915
1·5	5·25	0·841	6·75	0·932	8·25	1·000	9·75	1·054
1·75	6·56	0·942	8·31	1·045	10·06	1·124	11·81	1·186
2·	8·	1·045	10·	1·155	12·	1·243	14·	1·314
2·25	9·56	1·143	11·81	1·261	14·06	1·357	16·31	1·436
2·5	11·25	1·240	13·75	1·365	16·25	1·468	18·75	1·553
2·75	13·06	1·336	15·81	1·466	18·56	1·576	21·31	1·668
3·	15·	1·431	18·	1·567	21·	1·682	24·	1·780
3·5	19·25	1·618	22·75	1·764	26·25	1·889	29·75	1·997
4·	24·	1·803	28·	1·956	32·	2·090	36·	2·207
4·5			33·75	2·146	38·25	2·287	42·75	2·412
5·			40·	2·333	45·	2·480	50·	2·612

d	b=14		b=16		b=18		b=20	
—	A	R	A	R	A	R	A	R
1·	15·	0·891	17·	0·903	19·	0·912	21·	0·920
1·25	19·06	1·087	21·56	1·104	24·06	1·117	26·56	1·129
1·5	23·25	1·275	26·25	1·297	29·25	1·315	32·25	1·330
1·75	27·56	1·454	31·06	1·482	34·56	1·506	38·06	1·525
2·	32·	1·628	36·	1·662	40·	1·691	44·	1·715
2·25	36·56	1·795	41·06	1·835	45·56	1·870	50·06	1·898
2·5	41·25	1·958	46·25	2·005	51·25	2·044	56·25	2·078
2·75	46·06	2·115	51·56	2·168	57·06	2·213	62·56	2·252
3·	51·	2·268	57·	2·328	63·	2·379	69·	2·422
3·25	56·06	2·417	62·56	2·484	69·06	2·541	75·56	2·589
3·5	61·25	2·563	68·25	2·635	75·25	2·697	82·25	2·751
3·75	66·56	2·709	74·06	2·783	81·56	2·851	89·06	2·998
4·	72·	2·845	80·	2·929	88·	3·002	96·	3·066
4·25	77·56	2·981	86·06	3·071	94·56	3·150	103·06	3·219
4·5	83·25	3·115	92·25	3·211	101·25	3·296	110·25	3·369
4·75	89·06	3·246	98·56	3·348	108·06	3·437	117·56	3·516
5·	95·	3·376	105·	3·484	115·	3·578	125·	3·661
5·5	107·25	3·630	118·25	3·748	129·25	3·852	140·25	3·944
6·	120·	3·875	132·	4·004	144·	4·117	156·	4·220
6·5	133·25	4·114	146·25	4·253	159·25	4·378	172·25	4·487
7·	147·	4·350	161·	4·497	175·	4·630	189·	4·748

TABLE IV.

PEZOIDAL SECTIONS OF CANALS WITH SIDE SLOPES OF ONE TO ONE,

widths (b) and depths of water (d).

d	$b=6$		$b=8$		$b=10$		$b=12$	
—	A	R	A	R	A	R	A	R
1·0	7·	0·793	9·	0·831	11·	0·858	13·	0·877
1·25	9·06	0·950	11·56	1·002	14·06	1·039	16·56	1·066
1·5	11·25	1·098	14·25	1·164	17·25	1·211	20·25	1·246
1·75	13·56	1·238	17·06	1·318	20·56	1·375	24·06	1·420
2·	16·	1·373	20·	1·464	24·	1·533	28·	1·586
2·25	18·56	1·502	23·06	1·606	27·56	1·684	32·06	1·746
2·5	21·25	1·626	26·25	1·742	31·25	1·831	36·25	1·901
2·75	24·06	1·747	29·56	1·873	35·06	1·972	40·56	2·051
3·	27·	1·864	33·	2·002	39·	2·110	45·	2·197
3·25	30·06	1·979	35·56	2·069	43·06	2·244	49·56	2·339
3·5	33·25	2·091	40·25	2·249	47·25	2·375	54·25	2·477
3·75	36·56	2·201	44·06	2·368	51·56	2·502	59·06	2·612
4·	40·	2·311	48·	2·486	56·	2·628	64·	2·745
4·5	47·25	2·523	56·25	2·714	65·25	2·871	74·25	3·003
5·	55·	2·731	65·	2·936	75·	3·107	85·	3·252

d	$b=25$		$b=30$		$b=35$		$b=40$	
—	A	R	A	R	A	R	A	R
1·0	26·	0·934	31·	0·944	36·	0·952	41·	0·957
1·5	39·75	1·359	47·25	1·380	54·75	1·395	62·25	1·407
2·	54·	1·761	64·	1·795	74·	1·820	84·	1·840
2·25	61·31	1·954	72·56	1·995	83·81	2·026	95·06	2·050
2·5	68·75	2·144	81·25	2·172	93·75	2·228	106·25	2·257
2·75	76·31	2·328	90·06	2·384	103·81	2·426	117·56	2·460
3·	84·	2·509	99·	2·573	114·	2·622	129·	2·661
3·25	91·81	2·684	108·06	2·758	124·31	2·815	140·56	2·838
3·5	99·75	2·858	117·25	2·939	134·75	3·001	152·25	3·051
3·75	107·81	3·028	126·56	3·141	145·31	3·197	164·06	3·242
4·	116·	3·193	136·	3·291	156·	3·368	176·	3·431
4·25	124·31	3·358	145·56	3·464	166·81	3·547	188·06	3·615
4·5	132·75	3·519	155·25	3·633	177·75	3·724	200·25	3·798
4·75	141·31	3·677	165·06	3·800	188·81	3·898	212·56	3·977
5·	150·	3·831	175·	3·965	200·	4·070	225·	4·155
5·5	167·75	4·136	195·25	4·286	222·75	4·406	250·25	4·504
6·	186·	4·432	216·	4·599	246·	4·733	276·	4·844
6·5	204·75	4·720	237·25	4·903	269·75	5·053	302·25	5·177
7·	224·	5·000	259·	5·201	294·	5·365	329·	5·501
7·5	243·75	5·274	281·25	5·492	318·75	5·671	356·25	5·830
8·	264·	5·541	304·	5·776	344·	5·968	384·	6·132

TABLE IV.

SECTIONAL AREAS (A) AND HYDRAULIC RADII (R), FOR TRA-

Corresponding to various bed-

d	b=50		b=60		b=70		b=80	
—	A	R	A	R	A	R	A	R
1·0	51·	·964	61·	0·971	71·	0·975	81·	0·978
2·0	104·	1·868	124·	1·889	144·	1·903	164·	1·915
2·25	117·56	2·086	140·06	2·110	162·56	2·129	185·06	2·143
2·5	131·25	2·300	156·25	2·330	181·25	2·352	206·25	2·369
2·75	145·06	2·511	172·56	2·546	200·06	2·572	227·56	2·592
3·	159·	2·719	189·	2·760	219·	2·790	249·	2·814
3·25	173·06	2·927	205·56	2·971	238·06	3·006	270·56	3·034
3·5	187·25	3·126	222·25	3·180	257·25	3·220	292·25	3·251
3·75	201·56	3·326	239·06	3·386	276·56	3·431	314·06	3·466
4·	216·	3·523	256·	3·590	296·	3·640	336·	3·680
4·25	230·56	3·717	273·06	3·791	315·56	3·847	358·06	3·891
4·5	245·25	3·910	290·25	3·991	335·25	4·052	380·25	4·101
4·75	260·06	4·100	307·56	4·188	355·06	4·256	402·56	4·308
5·	275·	4·287	325·	4·384	375·	4·457	425·	4·514
5·25	290·06	4·473	342·56	4·577	395·06	4·656	447·56	4·719
5·5	305·25	4·656	360·25	4·768	415·25	4·853	470·25	4·921
5·75	320·56	4·838	378·06	4·957	435·56	5·049	493·06	5·122
6·	336·	5·017	396·	5·145	456·	5·243	516·	5·321
6·25	351·56	5·195	414·06	5·330	476·56	5·435	539·06	5·519
6·5	367·25	5·371	432·25	5·515	497·25	5·626	562·25	5·715
6·75	383·06	5·544	450·56	5·697	518·06	5·815	585·56	5·909
7·	399·	5·716	469·	5·877	539·	6·002	609·	6·102
7·25	415·06	5·887	487·56	6·056	560·06	6·188	632·56	6·293
7·5	431·25	6·056	506·25	6·234	581·25	6·373	656·25	6·484
7·75	447·56	6·223	525·06	6·409	602·56	6·555	680·06	6·672
8·	464·	6·389	544·	6·584	624·	6·736	704·	6·860
8·25	480·56	6·553	563·06	6·757	645·56	6·917	728·06	7·046
8·5	497·25	6·716	582·25	6·928	667·25	7·095	752·25	7·230
8·75	514·06	6·877	601·56	7·098	689·06	7·272	776·56	7·414
9·	531·	7·037	621·	7·267	711·	7·448	801·	7·595
9·25	548·06	7·196	640·56	7·434	733·06	7·623	825·56	7·777
9·5	565·25	7·353	660·25	7·600	755·25	7·797	850·25	7·956
9·75	582·56	7·509	680·06	7·765	777·56	7·968	875·06	8·134
10·	600·	7·665	700·	7·929	800·	8·140	900·	8·312
11·	671·	8·273	781·	8·572	891·	8·812	1001·	9·009
12·	744·	8·863	864·	9·197	984·	9·467	1104·	9·689

TABLE IV.

pezoidal Sections of Canals with Side Slopes of One to One,

widths (b) and depths of water (d).

d	b=90		b=100		b=120		b=140	
—	A	R	A	R	A	R	A	R
1·0	91·	0·980	101·	0·982	121·	0·985	141·	0·987
2·0	184·	1·923	204·	1·931	244·	1·942	284·	1·950
2·25	207·56	2·154	230·06	2·163	275·06	2·177	320·06	2·187
2·5	231·25	2·382	256·25	2·393	306·25	2·410	356·25	2·422
2·75	255·06	2·609	282·56	2·622	337·56	2·642	392·56	2·656
3·	279·	2·833	309·	2·848	369·	2·872	429·	2·889
3·25	303·06	3·055	335·56	3·073	400·56	3·101	465·56	3·121
3·5	327·25	3·276	362·25	3·296	432·25	3·328	502·25	3·351
3·75	351·56	3·494	389·06	3·517	464·06	3·553	539·06	3·579
4·	376·	3·711	416·	3·737	496·	3·777	576·	3·807
4·25	400·56	3·926	443·06	3·955	528·06	4·	613·06	4·033
4·5	425·25	4·139	470·25	4·171	560·25	4·221	650·25	4·258
4·75	450·06	4·351	497·56	4·386	592·56	4·441	687·56	4·481
5·	475·	4·562	525·	4·600	625·	4·659	725·	4·703
5·25	500·06	4·769	552·56	4·811	657·56	4·876	762·56	4·924
5·5	525·25	4·976	580·25	5·021	690·25	5·092	800·25	5·144
5·75	550·56	5·181	608·06	5·230	723·06	5·306	838·06	5·363
6·	576·	5·397	636·	5·437	756·	5·519	876·	5·581
6·25	601·56	5·587	664·06	5·643	789·06	5·731	914·06	5·797
6·5	627·25	5·788	692·25	5·848	822·25	5·942	952·25	6·013
6·75	653·06	5·986	720·56	6·050	855·56	6·151	990·56	6·226
7·	679·	6·184	749·	6·252	889·	6·359	1029·	6·439
7·25	705·06	6·380	777·56	6·452	922·56	6·566	1067·56	6·651
7·5	731·25	6·575	806·25	6·652	956·25	6·772	1106·25	6·862
7·75	757·56	6·769	835·06	6·849	990·06	6·976	1145·06	7·072
8·	784·	6·961	864·	7·046	1024·	7·179	1184·	7·280
8·25	810·56	7·152	893·06	7·241	1058·06	7·382	1223·06	7·488
8·5	837·25	7·342	922·25	7·435	1092·25	7·583	1262·25	7·695
8·75	864·06	7·530	951·56	7·628	1126·56	7·783	1301·56	7·900
9·	891·	7·717	981·	7·819	1161·	7·982	1341·	8·105
9·25	918·06	7·903	1010·56	8·010	1195·56	8·180	1380·56	8·289
9·5	945·25	8·088	1040·25	8·199	1230·25	8·376	1420·25	8·511
9·75	972·56	8·271	1070·06	8·387	1265·06	8·572	1460·06	8·713
10·	1000·	8·454	1100·	8·575	1300·	8·767	1500·	8·912
11·	1111·	9·173	1221·	9·313	1441·	9·536	1661·	9·707
12·	1224·	9·876	1344·	$\overline{10·03}$	1584·	$\overline{10·29}$	1824·	$\overline{10·49}$

TABLE IV.

Sectional Areas (A) and Hydraulic Radii (R), for Tra-

Corresponding to various bed-

d	b=160 A	b=160 R	b=180 A	b=180 R	b=200 A	b=200 R	b=220 A	b=220 R
1·0	161·	0·989	181·	0·990	201·	0·991	221·	0·992
2·0	324·	1·956	364·	1·961	404·	1·964	444·	1·968
2·25	365·06	2·194	410·06	2·200	455·06	2·205	500·06	2·209
2·5	406·25	2·432	456·25	2·439	506·25	2·445	556·25	2·450
2·75	447·56	2·668	502·56	2·676	557·56	2·683	612·56	2·689
3·	489·	2·902	549·	2·913	609·	2·921	669·	2·928
3·25	530·56	3·136	595·56	3·148	660·56	3·158	725·56	3·166
3·5	572·25	3·368	642·25	3·382	712·25	3·393	782·25	3·403
3·75	614·06	3·599	689·06	3·615	764·06	3·628	839·06	3·638
4·	656·	3·829	736·	3·847	816·	3·862	896·	3·874
4·25	698·06	4·058	783·06	4·078	868·06	4·094	953·06	4·108
4·5	740·25	4·286	830·25	4·308	920·25	4·326	1010·25	4·341
4·75	782·56	4·512	877·56	4·537	972·56	4·557	1067·56	4·573
5·	825·	4·738	925·	4·765	1025·	4·787	1125·	4·805
5·25	867·56	4·962	972·56	4·991	1077·56	5·015	1182·56	5·035
5·5	910·25	5·185	1020·25	5·217	1130·25	5·243	1240·25	5·265
5·75	953·06	5·407	1068·06	5·442	1183·06	5·470	1298·06	5·494
6·	996·	5·628	1116·	5·666	1236·	5·697	1356·	5·722
6·25	1039·06	5·848	1164·06	5·889	1289·06	5·921	1414·06	5·949
6·5	1082·25	6·067	1212·25	6·111	1342·25	6·146	1472·25	6·176
6·75	1125·56	6·285	1260·56	6·332	1395·56	6·370	1530·56	6·402
7·	1169·	6·498	1309·	6·552	1449·	6·592	1589·	6·626
7·25	1212·56	6·717	1357·56	6·770	1502·56	6·814	1647·56	6·850
7·5	1256·25	6·927	1406·25	6·973	1556·25	7·035	1706·25	7·074
7·75	1300·06	7·146	1455·06	7·206	1610·06	7·255	1765·06	7·296
8·	1344·	7·359	1504·	7·422	1664·	7·474	1824·	7·518
8·5	1432·25	7·782	1602·25	7·853	1772·25	7·910	1942·25	7·959
9·	1521·	8·201	1701·	8·279	1881·	8·343	2061·	8·397
9·5	1610·25	8·617	1800·25	8·702	1990·25	8·773	2180·25	8·832
10·	1700·	9·029	1900·	9·122	2100·	9·199	2300·	9·264
11·	1881·	9·843	2101·	9·952	2321·	10·04	2541·	10·12
12·	2064·	10·64	2304·	10·77	2544·	10·87	2784·	10·96
13·	2249·	11·43	2509·	11·59	2769·	11·69	3029·	11·80
14·	2436·	12·20	2716·	12·37	2996·	12·50	3276·	12·62
15·	2625·	12·97	2925·	13·15	3225·	13·30	3525·	13·46
16·	2816·	13·72	3136·	13·92	3456·	14·09	3776·	14·24

TABLE IV.

PEZOIDAL SECTIONS OF CANALS WITH SIDE SLOPES OF ONE TO ONE,

widths (b) and depths of water (d).

d	$b=240$		$b=260$		$b=280$		$b=300$	
—	A	R	A	R	A	R	A	R
2·0	484·	1·970	524·	1·972	564·	1·974	604·	1·976
2·5	606·25	2·454	656·25	2·457	706·25	2·460	756·25	2·463
3·	729·	2·934	789·	2·939	849·	2·943	909·	2·947
3·25	790·56	3·173	855·56	3·178	920·56	3·183	985·56	3·188
3·5	852·25	3·411	922·25	3·417	992·25	3·423	1062·25	3·428
3·75	914·06	3·647	989·06	3·655	1064·06	3·662	1139·06	3·667
4·	976·	3·884	1056·	3·892	1136·	3·900	1216·	3·906
4·25	1038·06	4·119	1123·06	4·129	1208·06	4·136	1293·06	4·144
4·5	1100·25	4·353	1190·25	4·364	1280·25	4·373	1370·25	4·382
4·75	1162·56	4·587	1257·56	4·599	1352·56	4·610	1447·56	4·619
5·	1225·	4·820	1325·	4·833	1425·	4·845	1525·	4·855
5·25	1287·56	5·053	1392·56	5·067	1497·56	5·079	1602·56	5·090
5·5	1350·25	5·283	1460·25	5·299	1570·25	5·313	1680·25	5·325
5·75	1413·06	5·514	1528·06	5·531	1643·06	5·546	1758·06	5·559
6·	1476·	5·744	1596·	5·762	1716·	5·778	1836·	5·792
6·25	1539·06	5·973	1664·06	5·993	1789·06	6·010	1914·06	6·025
6·5	1602·25	6·201	1732·25	6·223	1862·25	6·241	1992·25	6·257
6·75	1665·56	6·429	1800·56	6·452	1935·56	6·470	2070·56	6·489
7·	1729·	6·655	1869·	6·680	2009·	6·701	2149·	6·720
7·25	1792·56	6·881	1937·56	6·908	2082·56	6·930	2227·56	6·950
7·5	1856·25	7·106	2006·25	7·134	2156·25	7·159	2306·25	7·180
7·75	1920·06	7·331	2075·06	7·361	2230·06	7·386	2385·06	7·392
8·	1984·	7·554	2144·	7·586	2304·	7·613	2464·	7·637
8·5	2112·25	8·000	2282·25	8·035	2452·25	8·066	2622·25	8·092
9·	2241·	8·442	2421·	8·481	2601·	8·515	2781·	8·545
9·5	2370·25	8·882	2560·25	8·925	2750·25	8·962	2940·25	8·995
10·	2500·	9·319	2700·	9·366	2900·	9·407	3100·	9·443
10·5	2630·25	9·753	2840·25	9·804	3050·25	9·849	3260·25	9·889
11·	2761·	10·18	2981·	10·24	3201·	10·29	3421·	10·33
11·5	2892·25	10·61	3122·25	10·67	3352·25	10·73	3582·25	10·77
12·	3024·	11·04	3264·	11·10	3504·	11·16	3744·	11·21
12·5	3156·25	11·46	3406·25	11·53	3656·25	11·59	3906·25	11·65
13·	3289·	11·88	3549·	11·96	3809·	12·02	4069·	12·08
14·	3556·	12·72	3836·	12·80	4116·	12·88	4396·	12·94
15·	3825·	13·54	4125·	13·64	4425·	13·72	4725·	13·80
16·	4096·	14·36	4416·	14·47	4736·	14·56	5056·	14·64
20·	5200·	17·53	5600·	17·69	6000·	17·83	6400·	17·95

TABLE IV.

SECTIONAL DATA.

MULTIPLIERS FOR OBTAINING VALUES OF R, THE HYDRAULIC RADIUS, FOR OTHER TRAPEZOIDAL SECTIONS, FROM THOSE GIVEN FOR RECTANGULAR SECTIONS.

$\frac{b}{d}$ is the ratio of the bed-width to the depth of water.

$\frac{b}{d}$	Ratios of Side Slopes.						
	$\frac{1}{12}$ to 1.	$\frac{1}{8}$ to 1.	$\frac{1}{2}$ to 1.	$\frac{3}{4}$ to 1.	$1\frac{1}{4}$ to 1.	$1\frac{1}{2}$ to 1.	2 to 1.
0·5	1·179	1·242	1·828	2·083	2·332	2·435	2·514
0·75	1·105	1·160	1·536	1·692	1·855	1·894	1·931
1·	1·081	1·119	1·391	1·500	1·606	1·628	1·645
1·25	1·064	1·095	1·305	1·386	1·460	1·473	1·477
1·5	1·054	1·078	1·249	1·313	1·364	1·371	1·368
2·	1·040	1·058	1·180	1·222	1·249	1·249	1·236
2·5	1·032	1·046	1·140	1·170	1·184	1·179	1·162
3·	1·026	1·038	1·114	1·136	1·142	1·135	1·115
3·5	1·023	1·033	1·096	1·113	1·114	1·106	1·084
4·	1·020	1·029	1·082	1·096	1·093	1·085	1·062
4·5	1·016	1·025	1·072	1·085	1·078	1·069	1·046
5·	1·016	1·023	1·064	1·073	1·067	1·057	1·038
6	1·013	1·018	1·052	1·059	1·051	1·041	1·019
7	1·011	1·016	1·044	1·049	1·039	1·031	1·009
8	1·010	1·014	1·038	1·042	1·032	1·023	1·002
9	1·009	1·012	1·033	1·036	1·027	1·018	0·998
10	1·008	1·011	1·030	1·032	1·023	1·014	0·995
12	1·006	1·009	1·024	1·026	1·017	1·009	0·992
14	1·005	1·008	1·021	1·022	1·013	1·006	0·990
16	1·004	1·007	1·018	1·018	1·011	1·004	0·989
18	1·004	1·006	1·016	1·016	1·009	1·003	0·989
20	1·004	1·005	1·014	1·014	1·007	1·002	0·989
30	1·003	1·003	1·009	1·009	1·004	1·000	0·990
40	1·002	1·003	1·007	1·007	1·002	1·000	0·992
50	1·001	1·002	1·005	1·005	1·002	0·999	0·992
60	1·001	1·002	1·005	1·005	1·001	0·999	0·994
70	1·001	1·001	1·004	1·004	1·001	0·999	0·995
80	1·001	1·001	1·003	1·003	1·001	0·999	0·995
90	1·001	1·001	1·003	1·003	1·001	0·999	0·995
100	1·001	1·001	1·003	1·003	1·001	0·999	0·996

To obtain values of A, the sectional area, for other trapezoidal sections, having m to 1 as the ratio of the side slopes, add md^2 to the values of A given for rectangular sections.

TABLE V.

MEAN VELOCITIES OF DISCHARGE IN FEET PER SECOND,

CORRESPONDING TO OBSERVED MAXIMUM VELOCITIES AND TO COEFFICIENTS (C), OF MEAN VELOCITY;

CALCULATED ACCORDING TO THE BAZIN FORMULA,

$$V_m = \frac{C \cdot V_x}{C + 0{\cdot}2535},$$

AND A TABLE OF LIMITING VELOCITIES FOR CULVERTS AND CANALS.

TABLE V.

Mean Velocities of Discharge corresponding to

C	Maximum Velocities. 0·5	0·75	1·	1·25	1·5	1·75	2·	2·25
0·25	0·248	0·373	0·497	0·621	0·745	0·869	0·994	1·118
0·30	0·271	0·407	0·542	0·678	0·813	0·949	1·084	1·220
0·35	0·290	0·435	0·580	0·725	0·870	1·015	1·160	1·305
0·40	0·306	0·459	0·612	0·765	0·918	1·071	1·224	1·377
0·45	0·320	0·480	0·640	0·800	0·959	1·119	1·279	1·439
0·50	0·332	0·498	0·664	0·830	0·995	1·161	1·327	1·493
0·55	0·342	0·514	0·685	0·856	1·027	1·198	1·370	1·541
0·60	0·352	0·527	0·703	0·879	1·055	1·231	1·406	1·582
0·65	0·360	0·540	0·719	0·900	1·079	1·259	1·439	1·619
0·70	0·367	0·551	0·734	0·918	1·102	1·285	1·469	1·651
0·75	0·374	0·561	0·747	0·935	1·121	1·308	1·495	1·682
0·80	0·380	0·570	0·759	0·950	1·139	1·329	1·519	1·709
0·85	0·385	0·578	C·770	0·963	1·156	1·348	1·541	1·733
0·90	0·390	0·585	0·780	0·975	1·171	1·366	1·561	1·756
0·95	0·395	0·592	0·789	0·987	1·184	1·382	1·579	1·777
1·00	0·399	0·599	0·798	0·998	1·197	1·397	1·596	1·796
1·05	0·403	0·604	0·806	1·007	1·208	1·410	1·611	1·813
1·10	0·406	0·610	0·813	1·016	1·219	1·422	1·626	1·829
1·15	0·410	0·615	0·819	1·025	1·229	1·434	1·639	1·844
1·20	0·413	0·619	0·826	1·032	1·238	1·445	1·651	1·858
1·25	0·416	0·624	0·831	1·040	1·247	1·455	1·663	1·871
1·30	0·418	0·628	0·837	1·046	1·255	1·464	1·674	1·883
1·35	0·421	0·632	0·842	1·053	1·263	1·474	1·684	1·895
1·40	0·423	0·635	0·847	1·059	1·270	1·482	1·694	1·905
1·45	0·426	0·638	0·851	1·064	1·277	1·490	1·702	1·915
1·50	0·428	0·642	0·855	1·070	1·283	1·497	1·711	1·925
1·55	0·430	0·645	0·860	1·075	1·289	1·504	1·719	1·934
1·60	0·432	0·647	0·863	1·079	1·295	1·511	1·726	1·942
1·65	0·433	0·650	0·867	1·084	1·300	1·517	1·734	1·950
1·70	0·435	0·653	0·870	1·088	1·306	1·523	1·741	1·958
1·75	0·437	0·655	0·873	1·092	1·310	1·529	1·747	1·966
1·80	0·438	0·658	0·877	1·096	1·315	1·534	1·754	1·973
1·85	0·440	0·660	0·880	1·100	1·319	1·539	1·759	1·979
1·90	0·441	0·662	0·882	1·103	1·324	1·544	1·765	1·985
1·95	0·442	0·664	0·885	1·106	1·327	1·548	1·770	1·991
2·00	0·444	0·666	0·888	1·110	1·331	1·553	1·775	1·997
2·10	0·446	0·669	0·892	1·116	1·339	1·562	1·785	2·008
2·20	0·448	0·673	0·897	1·121	1·345	1·569	1·794	2·018

TABLE V.

OBSERVED MAXIMUM VELOCITIES AND COEFFICIENTS (C).

C	Maximum Velocities. 2·5	2·75	3·	3·25	3·5	3·75	4·	4·25
0·25	1·241	1·366	1·490	1·614	1·738	1·862	1·986	2·111
0·30	1·355	1·491	1·626	1·762	1·897	2·033	2·168	2·304
0·35	1·450	1·595	1·740	1·885	2·030	2·175	2·320	2·465
0·40	1·530	1·683	1·836	1·989	2·142	2·295	2·448	2·601
0·45	1·599	1·727	1·919	2·079	2·239	2·399	2·568	2·718
0·50	1·659	1·825	1·991	2·157	2·323	2·489	2·654	2·820
0·55	1·711	1·883	2·054	2·225	2·396	2·567	2·738	2·910
0·60	1·758	1·933	2·109	2·285	2·461	2·636	2·812	2·988
0·65	1·799	1·942	2·158	2·338	2·518	2·698	2·878	3·057
0·70	1·836	2·019	2·203	2·386	2·570	2·753	2·937	3·120
0·75	1·869	2·055	2·242	2·429	2·616	2·803	2·990	3·176
0·80	1·899	2·088	2·278	2·468	2·658	2·848	3·038	3·227
0·85	1·926	2·118	2·311	2·503	2·696	2·888	3·081	3·273
0·90	1·951	2·146	2·341	2·536	2·731	2·926	3·121	3·316
0·95	1·974	2·171	2·368	2·566	2·763	2·960	3·158	3·355
1·00	1·995	2·194	2·393	2·593	2·792	2·992	3·192	3·391
1·05	2·014	2·215	2·416	2·618	2·819	3·020	3·222	3·423
1·10	2·032	2·235	2·438	2·642	2·845	3·048	3·251	3·454
1·15	2·049	2·254	2·459	2·664	2·869	3·073	3·278	3·483
1·20	2·064	2·270	2·477	2·683	2·890	3·096	3·302	3·509
1·25	2·079	2·287	2·495	2·703	2·911	3·118	3·326	3·534
1·30	2·092	2·301	2·510	2·720	2·929	3·138	3·347	3·556
1·35	2·105	2·316	2·526	2·737	2·947	3·158	3·368	3·579
1·40	2·117	2·329	2·540	2·752	2·964	3·175	3·387	3·599
1·45	2·128	2·341	2·554	2·766	2·979	3·192	3·405	3·618
1·50	2·139	2·353	2·567	2·781	2·995	3·208	3·422	3·636
1·55	2·149	2·364	2·579	2·794	3·009	3·223	3·438	3·653
1·60	2·158	2·374	2·590	2·805	3·021	3·237	3·453	3·669
1·65	2·167	2·384	2·600	2·817	3·034	3·250	3·467	3·684
1·70	2·176	2·394	2·611	2·829	3·046	3·264	3·482	3·699
1·75	2·184	2·402	2·621	2·839	3·058	3·276	3·494	3·713
1·80	2·191	2·411	2·630	2·850	3·069	3·288	3·507	3·726
1·85	2·199	2·419	2·639	2·859	3·079	3·298	3·518	3·738
1·90	2·206	2·427	2·647	2·868	3·088	3·309	3·530	3·750
1·95	2·212	2·433	2·654	2·876	3·097	3·318	3·539	3·760
2·00	2·219	2·441	2·663	2·885	3·107	3·328	3·550	3·772
2·10	2·231	2·454	2·677	2·900	3·123	3·347	3·570	3·793
2·20	2·242	2·466	2·690	2·915	3·139	3·363	3·587	3·811

TABLE V.

MEAN VELOCITIES OF DISCHARGE CORRESPONDING TO

C	Maximum Velocities. 4·5	4·75	5·	5·25	5·5	5·75	6·	6·25
0·25	2·235	2·359	2·483	2·608	2·732	2·857	2·980	3·104
0·30	2·439	2·575	2·710	2·846	2·982	3·117	3·252	3·388
0·35	2·610	2·755	2·900	3·045	3·190	3·335	3·480	3·625
0·40	2·754	2·907	3·060	3·213	3·366	3·519	3·672	3·825
0·45	2·878	3·038	3·198	3·358	3·518	3·678	3·838	3·998
0·50	2·986	3·152	3·318	3·484	3·650	3·816	3·982	4·148
0·55	3·081	3·252	3·423	3·595	3·766	3·938	4·108	4·280
0·60	3·164	3·339	3·515	3·691	3·866	4·042	4·218	4·434
0·65	3·217	3·417	3·597	3·777	3·957	4·137	4·316	4·496
0·70	3·304	3·488	3·671	3·853	4·038	4·222	4·406	4·590
0·75	3·363	3·550	3·737	3·924	4·110	4·297	4·484	4·671
0·80	3·417	3·607	3·797	3·987	4·176	4·366	4·556	4·746
0·85	3·466	3·659	3·851	4·044	4·236	4·429	4·622	4·815
0·90	3·511	3·706	3·901	4·097	4·292	4·487	4·682	4·880
0·95	3·552	3·749	3·947	4·144	4·342	4·539	4·736	4·933
1·00	3·590	3·790	3·989	4·189	4·388	4·587	4·786	4·986
1·05	3·624	3·826	4·027	4·228	4·430	4·631	4·832	5·033
1·10	3·658	3·861	4·064	4·267	4·470	4·673	4·876	5·079
1·15	3·688	3·893	4·097	4·303	4·508	4·713	4·918	5·122
1·20	3·715	3·922	4·128	4·334	4·541	4·747	4·954	5·160
1·25	3·742	3·950	4·157	4·366	4·574	4·782	4·990	5·197
1·30	3·766	3·975	4·184	4·393	4·602	4·812	5·021	5·230
1·35	3·789	4·000	4·210	4·421	4·631	4·842	5·052	5·263
1·40	3·811	4·022	4·234	4·446	4·657	4·869	5·081	5·292
1·45	3·830	4·043	4·256	4·469	4·682	4·894	5·107	5·320
1·50	3·850	4·064	4·277	4·492	4·706	4·920	5·134	5·347
1·55	3·868	4·083	4·297	4·513	4·728	4·943	5·158	5·372
1·60	3·884	4·100	4·316	4·532	4·748	4·963	5·179	5·395
1·65	3·904	4·117	4·334	4·551	4·767	4·984	5·201	5·417
1·70	3·917	4·134	4·351	4·570	4·787	5·005	5·222	5·440
1·75	3·931	4·150	4·367	4·586	4·805	5·023	5·242	5·460
1·80	3·944	4·163	4·383	4·601	4·820	5·039	5·258	5·478
1·85	3·958	4·178	4·397	4·618	4·838	5·058	5·278	5·497
1·90	3·971	4·191	4·412	4·633	4·853	5·074	5·294	5·515
1·95	3·982	4·203	4·425	4·645	4·866	5·088	5·309	5·530
2·00	3·994	4·216	4·438	4·660	4·882	5·104	5·326	5·547
2·10	4·016	4·239	4·462	4·685	4·908	5·131	5·354	5·578
2·20	4·036	4·260	4·484	4·708	4·932	5·157	5·381	5·605

TABLE V.

OBSERVED MAXIMUM VELOCITIES AND COEFFICIENTS (C).

C	Maximum Velocities.							
	6·5	6·75	7·	7·25	7·5	7·75	8·	8·25
0·25	3·228	3·352	3·476	3·600	3·724	3·848	3·972	4·097
0·30	3·524	3·659	3·794	3·930	4·066	4·201	4·336	4·472
0·35	3·770	3·915	4·060	4·205	4·350	4·495	4·640	4·785
0·40	3·978	4·131	4·284	4·437	4·590	4·743	4·896	5·049
0·45	4·158	4·318	4·478	4·638	4·798	4·958	5·118	5·278
0·50	4·314	4·480	4·646	4·812	4·978	5·144	5·308	5·476
0·55	4·450	4·621	4·792	4·963	5·134	5·305	5·476	5·648
0·60	4·570	4·746	4·922	5·098	5·272	5·448	5·624	5·800
0·65	4·676	4·856	5·036	5·216	5·396	5·576	5·756	5·936
0·70	4·772	4·956	5·140	5·326	5·506	5·690	5·874	6·058
0·75	4·858	5·045	5·232	5·419	5·606	5·793	5·980	6·167
0·80	4·936	5·126	5·316	5·506	5·696	5·886	6·076	6·266
0·85	5·006	5·199	5·392	5·584	5·776	5·969	6·162	6·355
0·90	5·072	5·267	5·462	5·657	5·852	6·047	6·242	6·437
0·95	5·132	5·329	5·526	5·723	5·920	6·117	6·316	6·513
1·00	5·186	5·384	5·584	5·784	5·984	6·184	6·384	6·583
1·05	5·236	5·437	5·638	5·839	6·040	6·242	6·444	6·646
1·10	5·283	5·485	5·690	5·893	6·096	6·299	6·502	6·706
1·15	5·327	5·532	5·737	5·942	6·147	6·352	6·557	6·762
1·20	5·366	5·573	5·779	5·986	6·192	6·398	6·605	6·811
1·25	5·405	5·613	5·821	6·029	6·237	6·445	6·653	6·861
1·30	5·439	5·648	5·858	6·067	6·276	6·485	6·694	6·904
1·35	5·473	5·684	5·894	6·105	6·315	6·526	6·736	6·947
1·40	5·504	5·716	5·928	6·139	6·351	6·563	6·774	6·986
1·45	5·533	5·746	5·958	6·171	6·384	6·597	6·810	7·022
1·50	5·561	5·775	5·989	6·203	6·407	6·631	6·845	7·059
1·55	5·587	5·802	6·017	6·232	6·447	6·662	6·877	7·092
1·60	5·611	5·827	6·042	6·258	6·474	6·690	6·906	7·121
1·65	5·634	5·851	6·068	6·284	6·501	6·718	6·934	7·151
1·70	5·658	5·875	6·093	6·310	6·528	6·746	6·963	7·181
1·75	5·678	5·897	6·115	6·334	6·552	6·770	6·989	7·207
1·80	5·697	5·916	6·135	6·354	6·573	6·792	7·011	7·230
1·85	5·717	5·937	6·157	6·377	6·597	6·817	7·037	7·257
1·90	5·736	5·956	6·177	6·397	6·618	6·839	7·059	7·280
1·95	5·751	5·972	6·194	6·415	6·636	6·857	7·078	7·300
2·00	5·769	5·991	6·213	6·435	6·657	6·879	7·101	7·323
2·10	5·801	6·024	6·247	6·470	6·693	6·916	7·139	7·362
2·20	5·829	6·053	6·278	6·502	6·726	6·950	7·174	7·399

TABLE V.

MEAN VELOCITIES OF DISCHARGE CORRESPONDING TO

C	Maximum Velocities.							
	8·5	8·75	9·	9·25	9·5	9·75	10·	10·25
0·25	4·222	4·346	4·470	4·594	4·718	4·842	4·965	5·09
0·30	4·608	4·743	4·878	5·014	5·150	5·285	5·420	5·56
0·35	4·930	5·075	5·220	5·365	5·510	5·655	5·800	5·95
0·40	5·202	5·355	5·508	5·661	5·814	5·967	6·120	6·27
0·45	5·436	5·596	5·756	5·916	6·076	6·236	6·395	6·56
0·50	5·640	5·806	5·972	6·138	6·304	6·470	6·636	6·81
0·55	5·820	5·991	6·162	6·333	6·504	6·674	6·845	7·02
0·60	5·976	6·152	6·328	6·504	6·678	6·854	7·030	7·21
0·65	6·114	6·294	6·474	6·654	6·834	7·014	7·194	7·38
0·70	6·240	6·424	6·608	6·792	6·976	7·158	7·342	7·53
0·75	6·352	6·539	6·726	6·913	7·100	7·287	7·474	7·67
0·80	6·454	6·644	6·834	7·024	7·214	7·404	7·594	7·79
0·85	6·546	6·739	6·932	7·125	7·318	7·510	7·703	7·90
0·90	6·632	6·827	7·022	7·217	7·412	7·607	7·802	8·00
0·95	6·710	6·907	7·104	7·302	7·498	7·697	7·894	8·09
1·00	6·782	6·980	7·180	7·380	7·580	7·779	7·978	8·18
1·05	6·846	7·047	7·248	7·450	7·652	7·854	8·055	8·26
1·10	6·908	7·112	7·316	7·518	7·722	7·925	8·128	8·33
1·15	6·967	7·171	7·376	7·581	7·786	7·991	8·194	8·41
1·20	7·018	7·224	7·430	7·637	7·843	8·050	8·256	8·46
1·25	7·069	7·276	7·484	7·692	7·900	8·108	8·314	8·53
1·30	7·113	7·322	7·531	7·740	7·950	8·159	8·368	8·58
1·35	7·157	7·368	7·578	7·789	7·999	8·210	8·419	8·64
1·40	7·198	7·409	7·621	7·833	8·045	8·256	8·467	8·68
1·45	7·235	7·448	7·661	7·874	8·086	8·299	8·512	8·73
1·50	7·273	7·486	7·700	7·914	8·128	8·342	8·554	8·77
1·55	7·307	7·521	7·736	7·951	8·166	8·381	8·595	8·82
1·60	7·337	7·553	7·769	7·985	8·200	8·416	8·633	8·85
1·65	7·368	7·584	7·801	8·018	8·235	8·451	8·668	8·89
1·70	7·398	7·616	7·834	8·051	8·269	8·486	8·702	8·92
1·75	7·426	7·644	7·862	8·081	8·299	8·518	8·734	8·95
1·80	7·449	7·669	7·888	8·107	8·326	8·545	8·765	8·99
1·85	7·477	7·696	7·916	8·136	8·356	8·576	8·795	9·02
1·90	7·500	7·721	7·942	8·162	8·383	8·603	8·823	9·05
1·95	7·521	7·742	7·963	8·184	8·406	8·627	8·849	9·07
2·00	7·545	7·766	7·988	8·210	8·432	8·654	8·875	9·10
2·10	7·585	7·809	8·032	8·255	8·478	8·701	8·923	9·15
2·20	7·623	7·847	8·071	8·295	8·520	8·744	8·967	9·19

TABLE V.

OBSERVED MAXIMUM VELOCITIES AND COEFFICIENTS (C).

C	Maximum Velocities.							
	10·5	10·75	11	11·25	11·5	11·75	12·	12·25
0·25	5·22	5·34	5·46	5·59	5·71	5·84	5·96	6·09
0·30	5·70	5·83	5·97	6·10	6·24	6·37	6·50	6·51
0·35	6·09	6·24	6·38	6·53	6·67	6·82	6·96	7·11
0·40	6·43	6·58	6·73	6·89	7·04	7·19	7·34	7·50
0·45	6·72	6·88	7·04	7·20	7·36	7·52	7·68	7·84
0·50	6·97	7·14	7·30	7·47	7·64	7·80	7·97	8·13
0·55	7·19	7·36	7·53	7·70	7·88	8·05	8·22	8·39
0·60	7·38	7·56	7·73	7·91	8·09	8·26	8·44	8·63
0·65	7·56	7·74	7·97	8·10	8·28	8·46	8·64	8·82
0·70	7·71	7·90	8·08	8·26	8·45	8·63	8·81	9·00
0·75	7·85	8·04	8·23	8·42	8·60	8·79	8·98	9·16
0·80	7·98	8·17	8·36	8·55	8·74	8·93	9·12	9·31
0·85	8·09	8·28	8·47	8·67	8·86	9·05	9·25	9·44
0·90	8·19	8·39	8·58	8·78	8·97	9·17	9·36	9·56
0·95	8·29	8·49	8·69	8·88	9·08	9·28	9·48	9·67
1·00	8·38	8·58	8·78	8·98	9·18	9·38	9·58	9·78
1·05	8·46	8·66	8·86	9·07	9·26	9·47	9·67	9·87
1·10	8·53	8·74	8·94	9·14	9·35	9·55	9·75	9·96
1·15	8·61	8·82	9·02	9·23	9·43	9·64	9·84	10·05
1·20	8·67	8·88	9·08	9·29	9·49	9·70	9·90	10·11
1·25	8·74	8·94	9·15	9·36	9·57	9·78	9·98	10·19
1·30	8·79	9·00	9·24	9·41	9·62	9·83	10·06	10·25
1·35	8·85	9·06	9·27	9·48	9·69	9·90	10·11	10·32
1·40	8·89	9·11	9·32	9·53	9·74	9·96	10·17	10·38
1·45	8·94	9·15	9·36	9·58	9·80	10·00	10·21	10·43
1·50	8·99	9·20	9·42	9·63	9·84	10·06	10·27	10·49
1·55	9·03	9·25	9·46	9·68	9·89	10·11	10·32	10·54
1·60	9·06	9·28	9·50	9·71	9·93	10·14	10·36	10·57
1·65	9·11	9·32	9·54	9·76	9·97	10·19	10·41	10·62
1·70	9·14	9·36	9·57	9·79	10·02	10·23	10·45	10·66
1·75	9·17	9·39	9·61	9·83	10·05	10·27	10·48	10·70
1·80	9·21	9·43	9·65	9·86	10·08	10·30	10·52	10·74
1·85	9·24	9·46	9·68	9·90	10·12	10·34	10·56	10·78
1·90	9·27	9·49	9·71	9·93	10·15	10·37	10·59	10·81
1·95	9·29	9·51	9·73	9·95	10·18	10·40	10·62	10·84
2·00	9·32	9·55	9·77	9·99	10·21	10·43	10·66	10·88
2·10	9·37	9·60	9·82	10·04	10·27	10·49	10·71	10·94
2·20	9·42	9·64	9·87	10·09	10·31	10·54	10·76	10·99

TABLE V.

MEAN VELOCITIES OF DISCHARGE CORRESPONDING TO

C	Maximum Velocities. 12·5	13·	13·5	14·	14·5	15·	15·5	16·
0·25	6·21	6·46	6·70	6·95	7·20	7·45	7·70	7·94
0·30	6·78	7·05	7·32	7·59	7·86	8·13	8·40	8·67
0·35	7·25	7·54	7·83	8·12	8·41	8·70	8·99	9·28
0·40	7·65	7·96	8·26	8·57	8·87	9·18	9·49	9·79
0·45	8·00	8·31	8·64	8·95	9·28	9·59	9·92	10·23
0·50	8·30	8·63	8·96	9·29	9·62	9·95	10·29	10·62
0·55	8·56	8·90	9·24	9·58	9·93	10·27	10·61	10·95
0·60	8·79	9·14	9·49	9·84	10·20	10·55	10·90	11·25
0·65	9·00	9·35	9·71	10·07	10·43	10·79	11·15	11·51
0·70	9·18	9·54	9·91	10·28	10·65	11·02	11·38	11·73
0·75	9·35	9·65	10·09	10·40	10·84	11·21	11·59	11·88
0·80	9·50	9·87	10·25	10·63	11·01	11·39	11·77	12·15
0·85	9·63	10·02	10·40	10·79	11·17	11·56	11·94	12·33
0·90	9·75	10·14	10·53	10·92	11·31	11·71	12·09	12·48
0·95	9·87	10·26	10·66	11·05	11·45	11·84	12·23	12·63
1·00	9·98	10·44	10·77	11·24	11·57	11·97	12·37	12·85
1·05	10·07	10·47	10·87	11·27	11·68	12·08	12·48	12·89
1·10	10·16	10·57	10·97	11·38	11·79	12·19	12·60	13·01
1·15	10·25	10·65	11·06	11·47	11·88	12·29	12·70	13·11
1·20	10·32	10·73	11·15	11·56	11·97	12·38	12·80	13·21
1·25	10·40	10·81	11·23	11·64	12·06	12·47	12·89	13·30
1·30	10·46	10·88	11·30	11·72	12·13	12·55	12·97	13·39
1·35	10·53	10·95	11·37	11·79	12·21	12·63	13·05	13·47
1·40	10·59	11·01	11·43	11·85	12·28	12·70	13·13	13·54
1·45	10·64	11·06	11·49	11·91	12·34	12·77	13·19	13·62
1·50	10·70	11·12	11·55	11·98	12·41	12·83	13·26	13·69
1·55	10·75	11·17	11·60	12·03	12·46	12·89	13·32	13·75
1·60	10·79	11·23	11·65	12·09	12·52	12·95	13·38	13·82
1·65	10·84	11·27	11·70	12·14	12·57	13·00	13·44	13·87
1·70	10·88	11·31	11·75	12·18	12·62	13·06	13·49	13·92
1·75	10·92	11·36	11·79	12·23	12·67	13·10	13·54	13·98
1·80	10·96	11·40	11·83	12·27	12·71	13·15	13·58	14·02
1·85	11·00	11·43	11·87	12·31	12·75	13·19	13·63	14·07
1·90	11·03	11·47	11·91	12·36	12·79	13·24	13·68	14·12
1·95	11·06	11·51	11·94	12·39	12·83	13·28	13·71	14·16
2·00	11·10	11·54	11·98	12·43	12·87	13·31	13·76	14·20
2·10	11·16	11·62	12·05	12·51	12·94	13·40	13·83	14·30
2·20	11·21	11·66	12·11	12·55	13·00	13·48	13·90	14·34

TABLE V.

OBSERVED MAXIMUM VELOCITIES AND COEFFICIENTS (C).

C	Maximum Velocities. 16·5	17·	17·5	18·	18·5	19·	19·5	20
0·25	8·19	8·43	8·69	8·94	9·19	9·43	9·68	9·93
0·30	8·94	9·21	9·49	9·76	10·03	10·30	10·57	10·84
0·35	9·57	9·86	10·15	10·44	10·73	11·02	11·31	11·60
0·40	10·10	10·40	10·71	11·02	11·32	11·63	11·93	12·24
0·45	10·56	10·87	11·19	11·51	11·83	12·15	12·47	12·79
0·50	10·95	11·28	11·61	11·94	12·28	12·61	12·94	13·27
0·55	11·30	11·63	11·98	12·32	12·67	13·01	13·35	13·69
0·60	11·60	11·95	12·31	12·65	13·01	13·36	13·71	14·06
0·65	11·87	12·23	12·59	12·95	13·31	13·67	14·03	14·39
0·70	12·12	12·48	12·85	13·21	13·58	13·95	14·32	14·68
0·75	12·33	12·62	13·08	13·37	13·83	14·11	14·57	14·95
0·80	12·53	12·91	13·29	13·67	14·05	14·43	14·81	
0·85	12·71	13·10	13·48	13·87	14·25	14·64		
0·90	12·87	13·26	13·66	14·04	14·43	14·82		
0·95	13·03	13·42	13·82	14·21	14·60	15·00		
1·00	13·17	13·65	13·97	14·45	14·76			
1·05	13·29	13·69	14·10	14·50	14·90			
1·10	13·41	13·82	14·22	14·63				
1·15	13·52	13·93	14·34	14·75				
1·20	13·62	14·03	14·45	14·86				
1·25	13·72	14·13	14·64	14·97				
1·30	13·81	14·23	14·74					
1·35	13·89	14·31	14·82					
1·40	13·97	14·39	14·90					
1·45	14·04	14·47	14·97					
1·50	14·12	14·54						
1·55	14·18	14·61						
1·60	14·24	14·68						
1·65	14·30	14·74						
1·70	14·36	14·79						
1·75	14·41	14·85						
1·80	14·46	14·90						
1·85	14·51	14·95						
1·90	14·56	15·00						
1·95	14·60							
2·00	14·65							
2·10	14·72							
2·20	14·80							

The limiting velocity for unstratified rock is 15 feet per second. *See* page 126.

TABLE IV.

Limiting Velocities for Culverts and Canals.

**Minima in Drainage for Cylindrical Pipes and Culverts.*

	Feet per Second.
For small drain pipes, under 6 inches in diameter	3·5
For drain pipes from 6 to 18 inches in diameter .	3·
Culverts from 1·5 to 4 feet in diameter . .	2·5
Larger cylindrical culverts	2·

For ovoidal culverts, the minima correspond to those for cylindrical culverts having the same values of R, the hydraulic radius;—for which see Table IV.

Maxima in Open Canals.

	Feet per Second.
For the worst, or most sandy soil . .	2·5
For sandy soil generally	2·75
For ordinary loam	3·
For firm gravel and hard soil . . .	4·
For brickwork, ashlar, or rubble in cement	5·5 to 7·5
For hard sound stratified rock . .	10
For very hard homogeneous rock . .	14 or 15

The minimum velocity in an open canal that will preclude silting depends not only on the absolute velocity itself, but also on the degree of turbidity of the water; this latter depending either on the admission of silt-bearing water into the canal, or on the fact of the applicable maximum limit having been exceeded somewhere; the erosion in one part of the course of the water inducing subsidence in another.

For maxima in open canals with reference to navigation or towage against stream, read the article on Towage in Jackson's "Hydraulic Manual and Statistics," (Allen), 1875, and calculate in accordance with the circumstances and speed required.

* These are extreme minima, ordinary working minima being 0·5 higher, or even more in small pipes.

PART II.

TABLES VI. TO XII.

CONSISTING OF FINAL RESULTS
GIVING FINAL QUANTITIES BY INSPECTION.

TABLE VI.

MEAN VELOCITIES OF DISCHARGE (V) IN FEET PER SECOND;

QUANTITIES DISCHARGED (Q) IN CUBIC FEET PER SECOND;

AND COEFFICIENTS OF MEAN VELOCITY (C);

FOR CULVERTS AND PIPES, IN GLAZED MATERIAL, OR VERY SMOOTH CEMENT, IN PERFECT ORDER, RUNNING FULL, BUT NOT UNDER PRESSURE; WHEN N, THE COEFFICIENT OF ROUGHNESS AND IRREGULARITY $=0{\cdot}010$.

GENERAL FORMULA, $Q = A.V = A.C.100\sqrt{RS}$.

TABLE VI.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts and Pipes, glazed or coated with very

Cylindrical Pipes.

N=0·010.

Diameter.		S per thousand. 20	17·5	15	12·5	10	9	8
3 inches	V	3·316	3·103	2·871	2·622	2·345	2·224	2·097
	Q	0·163	0·152	0·141	0·129	0·115	0·109	0·103
	C	0·938	...	...	...	...	...	0·938
4 inches	V	3·830	3·582	3·317	3·028	2·707	2·568	2·422
	Q	0·334	0·312	0·289	0·264	0·236	0·224	0·211
	C	0·938	...	...	...	...	...	0·938
6 inches	V	5·025	4·700	4·352	3·972	3·554	3·371	3·178
	Q	0·986	0·923	0·855	0·780	0·698	0·662	0·624
	C	1·005	...	...	...	...	...	1·005
8 inches	V	6·246	5·844	5·410	4·938	4·417	4·191	3·950
	Q	2·180	2·040	1·888	1·723	1·541	1·463	1·379
	C	1·082	...	...	...	...	...	1·082
9 inches	V	6·864	6·421	5·947	5·428	4·854	4·605	4·342
	Q	3·033	2·837	2·627	2·398	2·145	2·035	1·918
	C	1·121	...	...	...	...	...	1·121
10 inches	V	7·378	6·900	6·390	5·833	5·217	4·929	4·666
	Q	4·024	3·764	3·485	3·181	2·845	2·688	2·545
	C	1·143	...	...	...	...	...	1·143
12 inches	V	8·443	7·897	7·311	6·674	5·970	5·663	5·340
	Q	6·631	6·202	5·742	5·242	4·689	4·448	4·194
	C	1·194	...	...	...	...	...	1·194
15 inches	V	9·938	9·296	8·607	7·856	6·674	6·332	5·970
	Q	12·20	11·41	10·56	9·641	8·191	7·770	7·326
	C	1·257	...	...	...	...	...	1·257
18 inches	V	11·33	10·60	9·810	8·955	8·010	7·598	7·164
	Q	20·02	18·72	17·34	15·82	14·16	13·43	12·66
	C	1·308	...	...	...	...	...	1·308

The coefficients (C) are assumed to remain constant for all values of S or when R is

TABLE VI.

(Q), and Coefficients (C) of Mean Velocity,

smooth cement, in perfect order, running just full.

Cylindrical Pipes.

N=0·010.

Diameter.		S per thousand. 7	6	5	4	3	2	1
3 inches	V	1·961	1·816	1·658	1·483	1·284	1·049	0·741
	Q	0·096	0·089	0·082	0·073	0·063	0·051	0·036
	C	0·938						0·938
4 inches	V	2·265	2·097	1·914	1·712	1·483	1·211	0·856
	Q	0·198	0·183	0·167	0·149	0·129	0·106	0·075
	C	0·938						0·938
6 inches	V	2·973	2·753	2·513	2·247	1·946	1·589	1·124
	Q	0·584	0·540	0·493	0·441	0·382	0·312	0·221
	C	1·005						1·005
8 inches	V	3·695	3·421	3·124	2·795	2·419	1·976	1·397
	Q	1·290	1·194	1·090	0·975	0·844	0·690	0·488
	C	1·082						1·082
9 inches	V	4·061	3·760	3·433	3·069	2·658	2·171	1·535
	Q	1·794	1·661	1·517	1·356	1·174	0·959	0·678
	C	1·121						1·121
10 inches	V	4·364	4·042	3·690	3·299	2·858	2·334	1·649
	Q	2·380	2·204	2·012	1·799	1·559	1·273	0·900
	C	1·143						1·143
12 inches	V	4·994	4·623	4·222	3·775	3·270	2·670	1·888
	Q	3·923	3·631	3·316	2·965	2·569	2·097	1·483
	C	1·194						1·194
15 inches	V	5·879	5·443	4·969	4·445	3·849	2·985	2·111
	Q	7·215	6·679	6·098	5·455	4·723	3·663	2·591
	C	1·257						1·257
18 inches	V	6·701	6·204	5·664	5·066	4·387	3·581	2·534
	Q	11·84	10·96	10·01	8·952	7·753	6·329	4·477
	C	1·308						1·308

above 1 per thousand; also again for diameters below 5 inches; less than 0·1 foot.

TABLE VI.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts and Pipes, glazed or coated with very

Cylindrical Pipes.

N=0·010.

Diam. in feet.		S per thousand. 5	4·5	4	3·5	3	2·5	2
1·5	V	5·664	5·373	5·066	4·739	4·387	4·005	3·581
	Q	10·01	9·495	8·952	8·374	7·753	7·078	6·329
	C	1·308						1·308
1·75	V	6·314	5·990	5·647	5·283	4·891	4·464	3·993
	Q	15·19	14·41	13·58	12·71	11·76	10·74	9·605
	C	1·350						1·350
2·	V	6·925	6·569	6·194	5·794	5·340	4·897	4·379
	Q	21·76	20·64	19·46	18·20	16·77	15·39	13·76
	C	1·385						1·385
2·25	V	7·514	7·129	6·721	6·287	5·821	5·314	4·753
	Q	29·88	28·34	26·72	25·00	23·14	21·13	18·90
	C	1·417						1·417
2·5	V	8·072	7·657	7·214	6·753	6·252	5·706	5·104
	Q	39·62	37·58	35·41	33·15	30·69	28·01	25·05
	C	1·444						1·444
2·75	V	8·613	8·170	7·703	7·205	6·671	6·089	5·447
	Q	51·15	48·53	45·75	42·80	39·62	36·16	32·35
	C	1·469						1·469
3·	V	9·129	8·661	8·166	7·639	7·072	6·456	5·775
	Q	64·53	61·22	57·72	53·99	49·99	45·64	40·82
	C	1·491						1·491
3·5	V	10·12	9·601	9·051	8·467	7·838	7·156	6·401
	Q	97·36	92·37	87·08	81·46	75·41	68·85	61·59
	C	1·530						1·530
4·	V	11·05	10·48	9·880	9·241	8·555	7·810	6·985
	Q	138·8	131·7	124·1	116·1	107·5	98·14	87·78
	C	1·562						1·562

The coefficients (C) are assumed to remain constant for all values of S or when R is

TABLE VI.

(Q), AND COEFFICIENTS (C), OF MEAN VELOCITY.

smooth cement, in perfect order, running just full.

Cylindrical Pipes.

N=0·010.

Diam. in feet.		S per thousand. 1·5	1·	0·9	0·8	0·7	0·6	0·5
1·5	V	3·101	2·534	2·401	2·259	2·108	1·944	1·766
	Q	5·480	4·477	4·243	3·991	3·724	3·435	3·121
	C	1·308	1·308	1·307	1·304	1·301	1·296	1·290
1·75	V	3·457	2·823	2·676	2·518	2·350	2·169	1·972
	Q	8·316	6·790	6·438	6·057	5·653	5·218	4·742
	C	1·350	1·350	1·349	1·346	1·343	1·339	1·333
2·	V	3·794	3·097	2·935	2·763	2·578	2·380	2·154
	Q	11·92	9·729	9·222	8·681	8·100	7·476	6·800
	C	1·385	1·385	1·384	1·381	1·378	1·374	1·369
2·25	V	4·115	3·360	3·186	2·997	2·797	2·583	2·351
	Q	16·36	13·36	12·67	11·92	11·12	10·27	9·348
	C	1·417	1·417	1·416	1·413	1·410	1·406	1·402
2·5	V	4·420	3·610	3·421	3·220	3·006	2·778	2·528
	Q	21·70	17·72	16·79	15·80	14·76	13·63	12·41
	C	1·444	1·444	1·443	1·440	1·437	1·434	1·430
2·75	V	4·718	3·852	3·651	3·438	3·212	2·967	2·701
	Q	28·03	22·88	21·68	20·42	19·08	17·62	16·04
	C	1·469	1·469	1·468	1·466	1·464	1·461	1·457
3·	V	5·001	4·084	3·871	3·642	3·402	3·143	2·861
	Q	35·35	28·87	27·36	25·74	24·05	22·22	20·23
	C	1·491	1·491	1·490	1·487	1·485	1·482	1·478
3·5	V	5·543	4·526	4·290	4·040	3·774	3·488	3·176
	Q	53·33	43·54	41·28	38·87	36·31	33·56	30·55
	C	1·530	1·530	1·529	1·527	1·525	1·522	1·518
4·	V	6·050	4·939	4·683	4·409	4·120	3·806	3·468
	Q	76·02	62·06	58·85	55·40	51·77	47·82	43·58
	C	1·562	1·562	1·561	1·559	1·557	1·554	1·551

above 1 per thousand; also again for diameters below 5 inches; less than 0·1 foot.

TABLE VI.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts, glazed or coated with very smooth

Cylindrical Culverts.

N=0·010.

Diam. in feet.		S per thousand. 1	0·9	0·8	0·7	0·6	0·5	0·45
4·	V	4·939	4·683	4·409	4·120	3·806	3·468	3·285
	Q	62·06	58·85	55·40	51·77	47·82	43·58	41·29
	C	1·562	1·561	1·559	1·557	1·554	1·551	1·549
4·5	V	5·333	5·056	4·761	4·448	4·113	3·746	3·550
	Q	84·81	80·41	75·72	70·73	65·41	59·58	56·47
	C	1·590	1·589	1·587	1·585	1·583	1·580	1·578
5·	V	5·707	5·410	5·097	4·762	4·404	4·013	3·802
	Q	112·1	106·2	100·1	93·51	86·48	78·79	74·66
	C	1·614	1·613	1·612	1·610	1·608	1·605	1·603
5·5	V	6·066	5·752	5·420	5·066	4·684	4·268	4·044
	Q	144·1	136·7	128·8	120·3	111·3	101·4	96·08
	C	1·636	1·635	1·634	1·633	1·631	1·628	1·626
6·	V	6·410	6·077	5·726	5·352	4·950	4·514	4·276
	Q	181·2	171·8	161·9	151·3	140·0	127·6	120·9
	C	1·655	1·654	1·653	1·652	1·650	1·648	1·646
6·5	V	6·744	6·394	6·024	5·631	5·208	4·748	4·502
	Q	223·8	212·2	199·9	186·9	172·8	157·6	149·4
	C	1·673	1·672	1·671	1·670	1·668	1·666	1·665
7·	V	7·061	6·700	6·313	5·901	5·460	4·978	4·720
	Q	271·7	257·9	243·0	227·1	210·1	191·6	181·6
	C	1·688	1·688	1·687	1·686	1·685	1·683	1·682
7·5	V	7·374	6·996	6·592	6·163	5·702	5·199	4·928
	Q	325·8	309·1	291·2	272·3	251·9	229·7	217·7
	C	1·703	1·703	1·702	1·701	1·700	1·698	1·697
8·	V	7·674	7·281	6·860	6·414	5·934	5·413	5·133
	Q	385·7	366·0	344·8	322·4	298·3	272·1	258·0
	C	1·716	1·716	1·715	1·714	1·713	1·712	1·711

The coefficients (C) are assumed to remain constant for all values of S
or when R is

TABLE VI.

(Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

cement, in perfect order, running just full.

Cylindrical Culverts.

N=0·010.

Diam. in feet.		S per thousand. 0·4	0·35	0·3	0·25	0·2	0·15	0·1
4·	V	3·092	2·887	2·662	2·422	2·151	1·845	1·478
	Q	38·85	36·28	33·45	30·44	27·03	23·18	18·57
	C	1·546	1·543	1·537	1·532	1·521	1·506	1·478
4·5	V	3·341	3·119	2·879	2·619	2·329	1·999	1·605
	Q	53·14	49·60	45·78	41·66	37·05	31·80	25·52
	C	1·575	1·572	1·567	1·562	1·553	1·539	1·514
5·	V	3·580	3·343	3·086	2·810	2·500	2·147	1·727
	Q	70·29	65·64	60·59	55·17	49·08	42·15	33·92
	C	1·601	1·598	1·594	1·590	1·581	1·568	1·545
5·5	V	3·808	3·555	3·284	2·990	2·663	2·290	1·844
	Q	90·48	84·46	78·03	71·05	63·26	54·42	43·80
	C	1·624	1·621	1·617	1·613	1·606	1·595	1·573
6·	V	4·026	3·762	3·476	3·165	2·820	2·427	1·958
	Q	113·8	106·4	98·29	89·50	79·72	68·62	55·35
	C	1·644	1·642	1·639	1·635	1·628	1·618	1·598
6·5	V	4·239	3·962	3·661	3·335	2·971	2·558	2·065
	Q	140·7	131·5	121·5	110·7	98·60	84·90	68·53
	C	1·663	1·661	1·658	1·655	1·648	1·639	1·621
7·	V	4·445	4·153	3·837	3·498	3·117	2·686	2·174
	Q	171·1	159·8	147·7	134·6	120·0	103·4	83·66
	C	1·680	1·678	1·675	1·672	1·666	1·658	1·643
7·5	V	4·641	4·336	4·009	3·657	3·262	2·811	2·275
	Q	205·0	191·6	177·1	161·6	144·1	124·2	100·5
	C	1·695	1·693	1·691	1·689	1·684	1·676	1·662
8·	V	4·836	4·519	4·178	3·810	3·398	2·931	2·376
	Q	243·1	227·2	210·0	191·5	170·8	147·3	119·4
	C	1·710	1·708	1·706	1·704	1·699	1·692	1·680

above 1 per thousand; also again for diameters below 5 inches; less than 0·1 foot.

TABLE VI.

Mean Velocities (V), Quantities discharged

For Culverts, glazed or coated with very smooth

Hawksley's Ovoid.

N=0·010.

Transverse Diameter.		S per thousand. 20	17·5	15	12·5	10	9	8
1′ 0″	V	9·162	8·570	7·935	7·243	6·479	6·146	5·794
	Q	9·121	8·532	7·899	7·211	6·450	6·119	5·768
	C	1·231						1·231
1′ 2″	V	10·18	9·525	8·820	8·051	7·200	6·832	6·440
	Q	13·80	12·91	11·95	10·91	9·757	9·257	8·726
	C	1·267						1·267
1′ 4″	V	11·22	10·47	9·694	8·849	7·916	7·509	7·079
	Q	19·86	18·53	17·16	15·66	14·01	13·29	12·53
	C	1·303						1·303
1′ 6″	V	12·16	11·38	10·53	9·615	8·600	8·158	7·692
	Q	27·27	25·51	23·62	21·56	19·29	18·29	17·25
	C	1·335						1·335
1′ 8″	V	13·09	12·24	11·33	10·35	9·255	8·779	8·278
	Q	36·19	33·85	31·34	28·61	25·59	24·28	22·89
	C	1·363						1·363
1′ 10″	V	13·99	13·08	12·11	11·06	9·890	9·383	8·846
	Q	46·79	43·77	40·53	37·00	33·09	31·39	29·60
	C	1·389						1·389
2′ 0″	V	14·85	13·89	12·86	11·74	10·50	9·962	9·391
	Q	59·13	55·31	51·21	46·75	41·81	39·67	37·40
	C	1·412						1·412
2′ 2″	V	15·68	14·67	13·59	12·40	11·09	10·52	9·919
	Q	73·29	68·56	63·47	57·94	51·83	49·16	46·35
	C	1·433						1·433
2′ 4″	V	16·50	15·44	14·29	13·05	11·67	11·07	10·44
	Q	89·45	83·66	77·46	70·71	63·25	60·00	56·57
	C	1·453						1·453

The coefficients (C) are assumed to remain constant for all values of S

TABLE VI.

(Q), and Coefficients (C) of Mean Velocity,

cement, in perfect order, running just full.

Hawksley's Ovoid.

N=0·010.

Transverse Diameter.		S per thousand. 7	6	5	4	3	2	1
1′ 0″	V	5·420	5·019	4·582	4·098	3·549	2·898	2·048
	Q	5·396	4·996	4·561	4·080	3·533	2·885	2·039
	C	1·231	...	...	...	...	...	1·231
1′ 2″	V	6·025	5·577	5·092	4·554	3·944	3·221	2·277
	Q	8·163	7·557	6·900	6·170	5·344	4·364	3·085
	C	1·267	...	...	...	...	...	1·267
1′ 4″	V	6·622	6·131	5·596	5·006	4·335	3·540	2·503
	Q	11·72	10·85	9·904	8·859	7·672	6·265	4·430
	C	1·303	...	...	...	...	...	1·303
1′ 6″	V	7·196	6·662	6·081	5·439	4·710	3·846	2·719
	Q	16·14	14·94	13·64	12·20	10·56	8·625	6·098
	C	1·335	...	...	...	...	...	1·335
1′ 8″	V	7·743	7·168	6·544	5·853	5·069	4·138	2·926
	Q	21·41	19·82	18·10	16·18	14·02	11·44	8·092
	C	1·363	...	...	...	...	...	1·363
1′ 10″	V	8·274	7·660	6·994	6·255	5·417	4·423	3·128
	Q	27·68	25·63	23·40	20·93	18·12	14·80	10·47
	C	1·389	...	...	...	...	...	1·389
2′ 0″	V	8·785	8·133	7·424	6·640	5·751	4·696	3·321
	Q	34·98	32·39	29·56	26·44	22·90	18·70	13·22
	C	1·412	...	...	...	...	...	1·412
2′ 2″	V	9·279	8·591	7·843	7·015	6·075	4·960	3·507
	Q	43·36	40·14	36·65	32·78	28·39	23·18	16·39
	C	1·433	...	...	...	...	...	1·433
2′ 4″	V	9·763	9·039	8·252	7·380	6·392	5·219	3·691
	Q	52·91	48·99	44·72	40·00	34·64	28·29	20·00
	C	1·453	...	...	...	...	...	1·453

above 1 per thousand; also again when R is less than 0·1 foot.

TABLE VI.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts, glazed or coated with very smooth

Hawksley's Ovoid.

N=0·010.

Transverse Diameter.		S per thousand. 5	4·5	4	3·5	3	2·5	2
2′ 6″	V	8·652	8·208	7·759	7·239	6·702	6·118	5·472
	Q	63·83	51·07	48·28	45·04	41·70	38·07	34·05
	C	1·471						1·471
2′ 8″	V	9·034	8·570	8·092	7·557	6·996	6·387	5·713
	Q	63·95	60·67	57·28	53·50	49·52	45·21	40·44
	C	1·487						1·487
2′ 10″	V	9·404	8·922	8·411	7·867	7·285	6·649	5·948
	Q	74·21	70·40	66·37	62·08	57·49	52·47	46·94
	C	1·502						1·502
3′ 0″	V	9·766	9·264	8·735	8·171	7·565	6·905	6·176
	Q	87·60	83·10	78·35	73·29	67·86	61·94	55·40
	C	1·516						1·516
3′ 2″	V	10·13	9·613	9·062	8·477	7·848	7·165	6·409
	Q	101·1	95·96	90·46	84·62	78·34	71·52	63·97
	C	1·531						1·531
3′ 4″	V	10·47	9·932	9·365	8·760	8·109	7·403	6·621
	Q	115·8	109·8	103·6	96·89	89·69	81·88	73·23
	C	1·542						1·542
3′ 6″	V	10·82	10·26	9·677	9·052	8·380	7·649	6·842
	Q	132·0	125·2	118·1	110·4	102·2	93·31	83·47
	C	1·555						1·555
3′ 8″	V	11·14	10·57	9·967	9·323	8·631	7·880	7·047
	Q	149·1	141·4	133·4	124·7	115·5	105·4	94·29
	C	1·565						1·565
3′ 10″	V	11·47	10·89	10·26	9·599	8·887	8·113	7·256
	Q	167·8	159·3	150·1	140·4	130·0	118·7	106·2
	C	1·576						1·576

The coefficients (C) are assumed to remain constant for all values of S

TABLE VI.

(Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

cement, in perfect order, running just full.

Hawksley's Ovoid.

N=0·010.

Transverse Diameter.		S per thousand. 1·5	1	0·9	0·8	0·7	0·6	0·5
2′ 6″	V	4·740	3·870	3·669	3·452	3·224	2·980	2·710
	Q	29·49	24·08	22·83	21·48	20·06	18·54	16·86
	C	1·471	1·471	1·470	1·467	1·465	1·462	1·457
2′ 8″	V	4·947	4·040	3·829	3·606	3·369	3·110	2·832
	Q	35·02	28·60	27·11	25·53	23·85	22·02	20·05
	C	1·487	1·487	1·486	1·484	1·482	1·478	1·474
2′ 10″	V	5·150	4·206	3·987	3·753	3·507	3·240	2·948
	Q	40·64	33·19	31·46	29·61	27·67	25·57	23·26
	C	1·502	1·502	1·501	1·499	1·497	1·494	1·489
3′ 0″	V	5·348	4·368	4·140	3·899	3·642	3·361	3·064
	Q	47·97	39·18	37·14	34·97	32·67	30·15	27·48
	C	1·516	1·516	1·515	1·513	1·511	1·508	1·504
3′ 2″	V	5·550	4·532	4·296	4·045	3·778	3·491	3·179
	Q	55·40	45·24	42·88	40·38	37·71	34·85	31·73
	C	1·531	1·531	1·530	1·528	1·526	1·523	1·519
3′ 4″	V	5·735	4·682	4·440	4·180	3·906	3·608	3·288
	Q	63·43	51·78	49·11	46·23	43·20	39·90	36·37
	C	1·542	1·542	1·541	1·539	1·537	1·534	1·531
3′ 6″	V	5·926	4·838	4·587	4·319	4·035	3·731	3·399
	Q	72·30	59·02	55·96	52·69	49·23	45·52	41·47
	C	1·555	1·555	1·554	1·552	1·550	1·548	1·545
3′ 8″	V	6·104	4·983	4·725	4·449	4·156	3·844	3·502
	Q	81·67	66·67	63·22	59·53	55·61	51·43	46·86
	C	1·565	1·565	1·564	1·562	1·560	1·558	1·555
3′ 10″	V	6·284	5·131	4·865	4·581	4·279	3·957	3·605
	Q	91·93	75·07	71·17	67·02	62·60	57·89	52·74
	C	1·576	1·576	1·575	1·573	1·571	1·569	1·566

above 1 per thousand; also again when R is less than 0·1 foot.

TABLE VI.

Mean Velocities (V), Quantities discharged

For Culverts, glazed or coated with very smooth

Hawksley's Ovoid.

N=0·010.

Transverse Diameter.		S per thousand. 1·	0·9	0·8	0·7	0·6	0·5	0·45
4′ 0″	V	5·275	5·001	4·709	4·398	4·068	3·707	3·512
	Q	84·03	79·67	75·01	70·06	64·80	59·05	55·95
	C	1·586	1·585	1·583	1·581	1·579	1·576	1·574
4′ 4″	V	5·555	5·266	4·961	4·635	4·286	3·905	3·701
	Q	103·8	98·42	92·72	86·63	80·11	72·98	69·17
	C	1·604	1·603	1·602	1·600	1·598	1·595	1·593
4′ 6″	V	5·691	5·395	5·084	4·753	4·395	4·004	3·794
	Q	114·8	108·9	102·6	95·92	88·69	80·80	76·56
	C	1·613	1·612	1·611	1·610	1·608	1·605	1·603
4′ 8″	V	5·828	5·526	5·207	4·867	4·500	4·101	3·885
	Q	126·4	119·8	112·9	105·5	97·56	88·91	84·23
	C	1·622	1·621	1·620	1·619	1·617	1·614	1·612
5′ 0″	V	6·088	5·772	5·438	5·083	4·702	4·287	4·062
	Q	151·5	143·7	135·4	126·5	117·0	106·7	101·1
	C	1·637	1·636	1·635	1·634	1·632	1·630	1·628
5′ 4″	V	6·345	6·016	5·668	5·298	4·900	4·465	4·232
	Q	179·7	170·4	160·5	150·0	138·8	126·4	119·9
	C	1·652	1·651	1·650	1·649	1·647	1·644	1·643
5′ 6″	V	6·466	6·131	5·778	5·400	4·994	4·553	4·314
	Q	194·7	184·6	174·0	162·6	150·4	137·1	129·9
	C	1·658	1·657	1·656	1·655	1·653	1·651	1·649
5′ 8″	V	6·592	6·248	5·889	5·505	5·090	4·641	4·399
	Q	208·0	197·2	185·9	173·7	160·6	146·5	138·8
	C	1·665	1·664	1·663	1·662	1·660	1·658	1·657
6′ 0″	V	6·832	6·482	6·107	5·710	5·280	4·814	4·564
	Q	244·9	232·3	218·9	204·6	189·2	172·5	163·6
	C	1·677	1·677	1·676	1·675	1·673	1·671	1·670

The coefficients (C) are assumed to remain constant for all values of S

TABLE VI.

(Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

cement, in perfect order, running just full.

Hawksley's Ovoid.

N=0·010.

Transverse Diameter.		S per thousand. 0·4	0·35	0·3	0·25	0·2	0·15	0·1
4′ 0″	V	3·304	3·084	2·846	2·591	2·302	1·976	1·586
	Q	52·63	49·13	45·33	41·27	36·67	31·48	25·26
	C	1·571	1·568	1·563	1·558	1·548	1·534	1·508
4′ 4″	V	3·484	3·254	3·005	2·735	2·432	2·088	1·679
	Q	65·12	60·82	56·16	51·12	45·45	39·02	31·38
	C	1·591	1·589	1·584	1·580	1·570	1·557	1·533
4′ 6″	V	3·571	3·335	3·079	2·803	2·493	2·141	1·723
	Q	72·06	67·30	62·13	56·56	50·31	43·21	34·77
	C	1·600	1·598	1·593	1·589	1·580	1·567	1·544
4′ 8″	V	3·656	3·416	3·155	2·872	2·555	2·196	1·768
	Q	79·26	74·06	68·40	62·26	55·39	47·61	38·33
	C	1·609	1·607	1·603	1·599	1·590	1·579	1·555
5′ 0″	V	3·824	3·573	3·300	3·006	2·674	2·300	1·853
	Q	95·18	88·93	82·14	74·82	66·56	57·25	46·12
	C	1·626	1·624	1·620	1·616	1·608	1·597	1·576
5′ 4″	V	3·986	3·724	3·440	3·132	2·790	2·399	1·937
	Q	112·9	105·5	97·42	88·70	79·01	67·94	54·86
	C	1·641	1·639	1·635	1·631	1·624	1·613	1·594
5′ 6″	V	4·062	3·795	3·507	3·194	2·844	2·448	1·975
	Q	122·3	114·3	105·6	96·17	85·63	73·71	59·47
	C	1·647	1·645	1·642	1·638	1·631	1·621	1·602
5′ 8″	V	4·144	3·871	3·577	3·259	2·901	2·497	2·017
	Q	130·8	122·2	112·9	102·9	91·56	78·81	63·66
	C	1·655	1·653	1·650	1·647	1·639	1·629	1·611
6′ 0″	V	4·298	4·015	3·712	3·381	3·014	2·596	2·097
	Q	154·0	143·9	133·0	121·2	108·0	93·04	75·16
	C	1·668	1·666	1·663	1·660	1·654	1·645	1·628

above 1 per thousand; also again when R is less than 0·1 foot.

TABLE VI.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts, glazed or coated with very smooth

Metropolitan Ovoid.

N=0·010.

Transverse Diameter.		S per thousand. 20	17·5	15	12·5	10	9	8
1′ 0″	V	9·436	8·827	8·171	7·460	6·672	6·330	5·968
	Q	10·84	10·14	9·388	8·572	7·666	7·273	6·857
	C	1·239						1·239
1′ 2″	V	10·52	9·844	9·114	8·320	7·442	7·059	6·656
	Q	12·16	11·38	10·54	9·618	8·603	8·160	7·694
	C	1·280						1·280
1′ 4″	V	11·56	10·82	10·01	9·141	8·176	7·757	7·313
	Q	23·61	22·09	20·44	18·67	16·70	15·84	14·93
	C	1·316						1·316
1′ 6″	V	12·56	11·75	10·88	9·928	8·881	8·425	7·942
	Q	32·46	30·36	28·11	25·65	22·95	21·77	20·52
	C	1·348						1·348
1′ 8″	V	13·53	12·66	11·72	10·70	9·570	9·079	8·560
	Q	43·16	40·39	37·39	34·13	30·53	28·96	27·31
	C	1·377						1·377
1′ 10″	V	14·45	13·52	12·51	11·42	10·22	9·692	9·138
	Q	55·78	52·19	48·29	44·08	39·45	37·41	35·27
	C	1·402						1·402
2′ 0″	V	15·32	14·33	13·27	12·11	10·84	10·28	9·692
	Q	70·38	65·83	60·96	55·63	49·80	47·23	44·53
	C	1·424						1·424
2′ 2″	V	16·19	15·16	14·03	12·81	11·46	10·87	10·25
	Q	87·30	81·74	75·65	69·07	61·79	58·61	55·27
	C	1·446						1·446
2′ 4″	V	17·04	15·94	14·75	13·47	12·05	11·43	10·77
	Q	106·6	99·67	92·23	84·23	75·35	71·47	67·34
	C	1·465						1·465

The coefficients (C) are assumed to remain constant for all values of S

TABLE VI.

(Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

cement, in perfect order, running just full.

Metropolitan Ovoid.

N=0·010.

Transverse Diameter.		S per thousand. 7	6	5	4	3	2	1
1′ 0″	V	5·583	5·168	4·718	4·220	3·655	2·984	2·110
	Q	6·415	5·938	5·421	4·849	4·200	3·429	2·424
	C	1·239						1·239
1′ 2″	V	6·226	5·764	5·262	4·707	4·076	3·328	2·353
	Q	7·197	6·663	6·083	5·441	4·712	3·847	2·720
	C	1·280						1·280
1′ 4″	V	6·841	6·333	5·781	5·171	4·478	3·656	2·586
	Q	13·97	12·93	11·80	10·56	9·144	7·466	5·281
	C	1·316						1·316
1′ 6″	V	7·430	6·879	6·279	5·617	4·864	3·971	2·808
	Q	19·20	17·78	16·22	14·51	12·57	10·26	7·256
	C	1·348						1·348
1′ 8″	V	8·007	7·412	6·767	6·052	5·242	4·280	3·027
	Q	25·54	23·64	21·59	19·31	16·72	13·65	9·656
	C	1·377						1·377
1′ 10″	V	8·548	7·913	7·225	6·462	5·595	4·569	3·230
	Q	33·00	30·54	27·89	24·94	21·60	17·64	12·47
	C	1·402						1·402
2′ 0″	V	9·065	8·393	7·663	6·852	5·935	4·846	3·426
	Q	41·64	38·56	35·20	31·48	27·27	22·26	15·74
	C	1·424						1·424
2′ 2″	V	9·587	8·876	8·103	7·247	6·277	5·125	3·624
	Q	51·69	47·86	43·69	39·08	33·85	27·63	19·54
	C	1·446						1·446
2′ 4″	V	10·08	9·331	8·518	7·618	6·597	5·387	3·809
	Q	63·03	58·35	53·26	47·64	41·25	33·68	23·82
	C	1·465						1·465

above 1 per thousand; also again when R is less than 0·1 foot.

TABLE VI.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts, glazed or coated with very smooth

Metropolitan Ovoid.

N=0·010.

Transverse Diameter.		S per thousand. 5·	4·5	4	3·5	3	2·5	2·
2′ 6″	V	8·917	8·459	7·975	7·460	6·906	6·304	5·639
	Q	64·01	60·72	57·24	53·55	49·57	45·25	40·48
	C	1·482						1·482
2′ 8″	V	9·319	8·840	8·336	7·796	7·219	6·588	5·894
	Q	76·11	72·20	68·08	63·67	58·96	53·80	48·14
	C	1·499						1·499
2′ 10″	V	9·694	9·196	8·671	8·110	7·509	6·854	6·131
	Q	89·38	84·79	79·95	74·77	69·23	63·19	56·53
	C	1·513						1·513
3′ 0″	V	10·07	9·556	9·009	8·427	7·802	7·124	6·370
	Q	104·1	98·77	93·12	87·10	80·64	73·63	65·84
	C	1·528						1·528
3′ 2″	V	10·43	9·899	9·332	8·745	8·083	7·380	6·600
	Q	120·2	114·0	107·5	100·7	93·12	85·02	76·03
	C	1·541						1·541
3′ 4″	V	10·80	10·25	9·660	9·037	8·365	7·636	6·830
	Q	137·8	130·8	123·3	115·3	106·7	97·44	87·15
	C	1·554						1·554
3′ 6″	V	11·14	10·57	9·967	9·323	8·631	7·880	7·047
	Q	156·7	148·7	140·2	131·2	121·4	108·7	99·15
	C	1·565						1·565
3′ 8″	V	11·49	10·90	10·28	9·615	8·901	8·126	7·268
	Q	177·1	168·0	158·4	148·2	137·2	125·2	112·0
	C	1·577						1·577
3′ 10″	V	11·83	11·22	10·58	9·895	9·162	8·395	7·481
	Q	199·7	189·4	178·6	167·0	154·7	141·7	126·3
	C	1·587						1·587

The coefficients (C) are assumed to remain constant for all values of S

TABLE VI.

(Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

cement, in perfect order, running just full.

Metropolitan Ovoid.

N=0·010.

Transverse Diameter.		S per thousand. 1·5	1·	0·9	0·8	0·7	0·6	0·5
2′ 6″	V	4·883	3·988	3·781	3·560	3·322	3·070	2·796
	Q	35·05	28·63	27·14	25·55	23·85	22·04	20·07
	C	1·482	1·482	1·481	1·479	1·476	1·473	1·469
2′ 8″	V	5·103	4·167	3·952	3·721	3·473	3·209	2·921
	Q	41·68	34·03	32·28	30·39	28·36	26·21	23·86
	C	1·499	1·499	1·498	1·496	1·493	1·490	1·486
2′ 10″	V	5·311	4·335	4·110	3·870	3·612	3·337	3·041
	Q	48·97	39·97	37·89	35·68	33·30	30·77	28·04
	C	1·513	1·513	1·512	1·510	1·507	1·504	1·501
3′ 0″	V	5·518	4·505	4·271	4·021	3·752	3·468	3·161
	Q	57·03	46·56	44·15	41·56	38·78	35·85	32·67
	C	1·528	1·528	1·527	1·525	1·522	1·519	1·516
3′ 2″	V	5·716	4·666	4·424	4·166	3·890	3·593	3·274
	Q	65·85	53·75	50·96	47·99	44·81	41·39	37·72
	C	1·541	1·541	1·540	1·538	1·535	1·532	1·529
3′ 4″	V	5·916	4·830	4·580	4·312	4·027	3·724	3·394
	Q	75·49	61·63	58·44	55·02	51·38	47·52	43·31
	C	1·554	1·554	1·553	1·551	1·549	1·547	1·544
3′ 6″	V	6·104	4·983	4·725	4·449	4·156	3·844	3·502
	Q	85·88	70·11	66·48	62·60	58·47	54·09	49·27
	C	1·565	1·565	1·564	1·562	1·560	1·558	1·555
3′ 8″	V	6·294	5·139	4·870	4·585	4·284	3·960	3·608
	Q	96·99	79·19	75·05	70·65	66·02	61·02	55·60
	C	1·577	1·577	1·575	1·573	1·571	1·569	1·566
3′ 10″	V	6·478	5·289	5·015	4·722	4·412	4·080	3·717
	Q	109·3	89·28	84·65	79·71	74·47	68·87	62·74
	C	1·587	1·587	1·586	1·584	1·582	1·580	1·577

above 1 per thousand; also again when R is less than 0·1 foot.

TABLE VI.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts, glazed or coated with very smooth

Metropolitan Ovoid.

N=0·010.

Transverse Diameter.		S per thousand. 1·	0·9	0·8	0·7	0·6	0·5	0·45
4′ 0″	V	5·436	5·155	4·857	4·537	4·195	3·822	3·622
	Q	99·91	94·75	89·27	83·39	77·10	70·25	66·57
	C	1·597	1·596	1·595	1·593	1·591	1·588	1·586
4′ 4″	V	5·722	5·425	5·112	4·775	4·415	4·023	3·811
	Q	123·4	117·0	110·3	103·0	95·23	86·78	82·20
	C	1·615	1·614	1·613	1·611	1·609	1·606	1·604
4′ 6″	V	5·864	5·560	5·239	4·894	4·554	4·151	3·933
	Q	136·4	129·3	121·9	113·8	105·9	96·55	91·48
	C	1·624	1·623	1·622	1·620	1·618	1·616	1·614
4′ 8″	V	6·001	5·689	5·361	5·008	4·631	4·222	4·001
	Q	150·1	142·3	134·1	125·3	115·8	105·6	100·1
	C	1·632	1·631	1·630	1·628	1·626	1·624	1·622
5′ 0″	V	6·270	5·944	5·601	5·236	4·842	4·415	4·182
	Q	180·0	170·7	160·8	150·3	139·0	126·8	120·1
	C	1·647	1·646	1·645	1·644	1·642	1·640	1·638
5′ 4″	V	6·533	6·194	5·837	5·456	5·046	4·599	4·359
	Q	213·4	202·4	190·7	178·2	164·9	150·2	142·4
	C	1·662	1·661	1·660	1·659	1·657	1·655	1·653
5′ 6″	V	6·657	6·315	5·951	5·563	5·145	4·690	4·444
	Q	231·3	219·4	206·7	193·3	178·7	162·9	154·4
	C	1·668	1·668	1·667	1·666	1·664	1·662	1·660
5′ 8″	V	6·787	6·439	6·067	5·671	5·244	4·782	4·531
	Q	250·3	237·5	223·8	209·1	193·4	176·4	167·1
	C	1·675	1·675	1·674	1·673	1·671	1·669	1·667
6′ 0″	V	7·033	6·672	6·287	5·877	5·434	4·956	4·699
	Q	290·8	275·9	260·0	243·0	224·7	204·9	194·3
	C	1·687	1·687	1·686	1·685	1·683	1·681	1·680

The coefficients (C) are assumed to remain constant for all values of S

TABLE VI.

(Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

cement, in perfect order, running just full.

Metropolitan Ovoid.

N=0·010.

Transverse Diameter.		S per thousand. 0·4	0·35	0·3	0·25	0·2	0·15	0·1
4′ 0″	V	3·408	3·182	2·937	2·674	2·376	2·040	1·640
	Q	62·64	58·49	53·98	49·15	43·67	37·50	30·14
	C	1·583	1·580	1·575	1·571	1·561	1·548	1·523
4′ 4″	V	3·590	3·354	3·094	2·819	2·506	2·153	1·732
	Q	77·44	72·35	66·74	60·81	54·05	46·44	37·36
	C	1·602	1·600	1·595	1·592	1·582	1·569	1·546
4′ 6″	V	3·682	3·460	3·175	2·893	2·571	2·210	1·779
	Q	85·64	80·48	73·85	67·30	59·80	51·40	41·38
	C	1·612	1·610	1·605	1·602	1·592	1·580	1·558
4′ 8″	V	3·768	3·517	3·249	2·957	2·629	2·264	1·823
	Q	94·24	87·96	81·26	73·95	65·75	56·62	45·60
	C	1·620	1·617	1·613	1·609	1·601	1·590	1·568
5′ 0″	V	3·938	3·680	3·401	3·096	2·756	2·372	1·913
	Q	113·1	105·7	97·64	88·89	79·12	68·10	54·92
	C	1·636	1·634	1·631	1·627	1·619	1·609	1·589
5′ 4″	V	4·104	3·836	3·544	3·228	2·876	2·475	1·998
	Q	134·1	125·3	115·8	105·5	93·96	80·86	65·27
	C	1·651	1·649	1·646	1·643	1·636	1·626	1·607
5′ 6″	V	4·185	3·910	3·613	3·293	2·933	2·526	2·039
	Q	145·4	135·8	125·5	114·4	101·9	87·75	70·83
	C	1·658	1·656	1·653	1·650	1·643	1·634	1·616
5′ 8″	V	4·267	3·986	3·684	3·357	2·990	2·575	2·082
	Q	157·4	147·0	135·9	123·8	110·3	94·97	76·78
	C	1·665	1·663	1·660	1·657	1·650	1·641	1·625
6′ 0″	V	4·425	4·133	3·822	3·484	3·104	2·674	2·163
	Q	183·0	170·9	158·0	144·1	128·4	110·6	89·44
	C	1·678	1·676	1·674	1·671	1·665	1·656	1·641

above 1 per thousand; also again when R is less than 0·1 foot.

TABLE VI.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts, glazed or coated with very smooth

Pegtop Section.

N=0·010.

Transverse Diameter.		S per thousand. 20	17·5	15	12·5	10	9	8
1′ 0″	V	8·888	8·313	7·697	7·027	6·285	5·962	5·621
	Q	9·235	8·637	7·997	7·301	6·530	6·195	5·840
	C	1·214						1·214
1′ 2″	V	9·850	9·214	8·531	7·788	6·966	6·608	6·230
	Q	13·93	13·03	12·06	11·01	9·850	9·344	8·809
	C	1·247						1·247
1′ 4″	V	10·93	10·23	9·469	8·644	7·732	7·334	6·915
	Q	20·18	18·88	17·48	15·96	14·27	13·54	12·77
	C	1·294						1·294
1′ 6″	V	11·88	11·11	10·29	9·393	8·401	7·970	7·514
	Q	27·76	25·96	24·05	21·95	19·63	18·63	17·56
	C	1·325						1·325
1′ 8″	V	12·81	11·98	11·09	10·13	9·060	8·595	8·103
	Q	36·96	34·56	31·99	29·32	26·14	24·80	23·38
	C	1·355						1·355
1′ 10″	V	13·71	12·82	11·87	10·84	9·693	9·196	8·671
	Q	47·86	44·75	41·44	37·84	33·84	32·10	30·27
	C	1·382						1·382
2′ 0″	V	14·54	13·60	12·59	11·49	10·28	9·752	9·193
	Q	60·40	56·49	52·30	47·73	42·70	40·51	38·19
	C	1·404						1·404
2′ 2″	V	15·35	14·36	13·29	12·13	10·85	10·30	9·707
	Q	74·82	69·99	64·78	59·12	52·88	50·20	47·31
	C	1·425						1·425
2′ 4″	V	16·13	15·09	13·97	12·75	11·41	10·82	10·20
	Q	91·20	85·32	78·99	72·09	64·51	61·18	57·67
	C	1·444						1·444

The coefficients (C) are assumed to remain constant for all values of S

TABLE VI.

(Q), and Coefficients (C) of Mean Velocity,

cement, in perfect order, running just full.

Pegtop Section.

N=0·010.

Transverse Diameter.		S per thousand. 7	6	5	4	3	2	1
1′ 0″	V	5·258	4·868	4·444	3·975	3·442	2·810	1·987
	Q	5·463	5·058	4·617	4·130	3·576	2·920	2·064
	C	1·214						1·214
1′ 2″	V	5·827	5·396	4·926	4·406	3·815	3·115	2·202
	Q	8·239	7·630	6·965	6·230	5·394	4·405	3·114
	C	1·247						1·247
1′ 4″	V	6·469	5·989	5·467	4·890	4·235	3·458	2·444
	Q	11·94	11·06	10·09	9·027	7·818	6·383	4·512
	C	1·294						1·294
1′ 6″	V	7·029	6·507	5·940	5·313	4·602	3·756	2·657
	Q	16·43	15·21	13·88	12·42	10·75	8·778	6·210
	C	1·325						1·325
1′ 8″	V	7·580	7·018	6·406	5·729	4·962	4·051	2·864
	Q	21·87	20·25	18·48	16·53	14·32	11·69	8·263
	C	1·355						1·355
1′ 10″	V	8·111	7·508	6·855	6·131	5·310	4·335	3·065
	Q	28·32	26·21	23·93	21·40	18·54	15·13	10·70
	C	1·382						1·382
2′ 0″	V	8·600	7·962	7·269	6·501	5·630	4·597	3·250
	Q	35·72	33·07	30·20	27·01	23·39	19·10	13·50
	C	1·404						1·404
2′ 2″	V	9·080	8·406	7·674	6·864	5·944	4·854	3·431
	Q	44·26	40·97	37·40	33·46	28·97	23·66	16·72
	C	1·425						1·425
2′ 4″	V	9·543	8·836	8·066	7·214	6·248	5·102	3·607
	Q	53·96	49·96	45·61	40·79	35·33	28·85	20·39
	C	1·444						1·444

above 1 per thousand; also again when R is less than 0·1 foot.

TABLE VI.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts, glazed or coated with very smooth

Pegtop Section.

N=0·010.

Transverse Diameter.		S per thousand. 5	4·5	4	3·5	3	2·5	2
2′ 6″	V	8·456	8·022	7·563	7·075	6·550	5·978	5·348
	Q	54·89	52·07	49·09	45·92	42·52	38·80	34·71
	C	1·462						1·462
2′ 8″	V	8·831	8·377	7·898	7·389	6·840	6·245	5·585
	Q	65·22	61·86	58·31	54·57	50·51	46·12	41·25
	C	1·478						1·478
2′ 10″	V	9·203	8·732	8·232	7·702	7·129	6·509	5·821
	Q	76·73	72·80	68·63	64·21	59·43	54·27	48·53
	C	1·494						1·494
3′ 0″	V	9·555	9·066	8·546	7·994	7·401	6·756	6·043
	Q	89·31	84·74	79·88	74·72	69·18	63·15	56·48
	C	1·508						1·508
3′ 2″	V	9·910	9·401	8·864	8·292	7·677	7·007	6·268
	Q	103·2	97·86	92·27	86·32	79·92	72·94	65·25
	C	1·522						1·522
3′ 4″	V	10·26	9·738	9·181	8·586	7·950	7·258	6·491
	Q	118·4	112·4	105·9	99·08	91·74	83·76	76·91
	C	1·536						1·536
3′ 6″	V	10·58	10·04	9·465	8·854	8·197	7·483	6·693
	Q	134·6	127·7	120·4	112·6	104·3	95·18	85·13
	C	1·546						1·546
3′ 8″	V	10·92	10·36	9·764	9·135	8·457	7·720	6·910
	Q	152·4	144·6	136·3	127·5	118·1	107·8	96·47
	C	1·558						1·558
3′ 10″	V	11·24	10·66	10·05	9·402	8·704	7·945	7·106
	Q	171·6	162·7	153·4	143·5	132·8	121·2	108·4
	C	1·568						1·568

The coefficients (C) are assumed to remain constant for all values of S

TABLE VI.

(Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

cement, in perfect order, running just full.

Pegtop Section.

N=0·010.

Transverse Diameter.		S per thousand. 1·5	1	0·9	0·8	0·7	0·6	0·5
2′ 6″	V	4·630	3·782	3·583	3·372	3·149	2·908	2·648
	Q	30·05	24·55	23·26	21·89	20·44	18·88	17·19
	C	1·462	1·462	1·460	1·458	1·455	1·452	1·448
2′ 8″	V	4·837	3·949	3·744	3·525	3·291	3·041	2·767
	Q	35·72	29·16	27·65	26·03	24·30	22·46	20·43
	C	1·478	1·478	1·477	1·475	1·472	1·469	1·465
2′ 10″	V	5·021	4·116	3·903	3·674	3·430	3·169	2·885
	Q	41·86	34·32	32·54	30·63	28·60	26·42	24·05
	C	1·494	1·494	1·463	1·491	1·488	1·485	1·481
3′ 0″	V	5·234	4·274	4·051	3·815	3·561	3·290	2·996
	Q	48·92	39·95	37·86	35·66	33·28	30·75	28·00
	C	1·508	1·508	1·507	1·505	1·502	1·499	1·495
3′ 2″	V	5·429	4·432	4·203	3·957	3·694	3·416	3·111
	Q	56·52	46·14	43·75	41·19	38·45	35·56	32·39
	C	1·522	1·522	1·521	1·519	1·517	1·514	1·511
3′ 4″	V	5·620	4·590	4·352	4·098	3·828	3·537	3·222
	Q	64·85	52·97	50·22	47·29	44·18	40·82	37·18
	C	1·536	1·536	1·535	1·533	1·531	1·528	1·525
3′ 6″	V	5·798	4·732	4·487	4·225	3·947	3·647	3·322
	Q	73·75	60·19	57·07	53·74	50·21	46·39	42·26
	C	1·546	1·546	1·545	1·543	1·541	1·538	1·535
3′ 8″	V	5·980	4·883	4·629	4·359	4·072	3·764	3·430
	Q	83·48	68·17	64·62	60·85	56·85	52·55	47·88
	C	1·558	1·558	1·557	1·555	1·553	1·551	1·548
3′ 10″	V	6·153	5·025	4·763	4·485	4·190	3·874	3·530
	Q	93·89	76·68	72·68	68·44	62·94	59·12	53·87
	C	1·568	1·568	1·567	1·565	1·563	1·561	1·558

above 1 per thousand; also again when R is less than 0·1 foot.

TABLE VI.

MEAN VELOCITY (V), QUANTITIES DISCHARGED

For Culverts, glazed or coated with very smooth

Pegtop Section.

N=0·010.

Transverse Diameter.		S per thousand. 1	0·9	0·8	0·7	0·6	0·5	0·45
4′ 0″	V	5·168	4·900	4·613	4·310	3·983	3·628	3·437
	Q	85·89	81·43	76·67	71·63	66·19	60·30	57·13
	C	1·579	1·578	1·576	1·574	1·571	1·568	1·566
4′ 4″	V	5·439	5·157	4·858	4·540	4·197	3·824	3·624
	Q	106·1	100·6	94·74	88·53	81·84	74·57	70·67
	C	1·597	1·596	1·595	1·593	1·591	1·588	1·586
4′ 6″	V	5·574	5·284	4·980	4·652	4·302	3·921	3·715
	Q	117·2	111·1	104·7	97·84	90·48	82·45	78·12
	C	1·606	1·605	1·604	1·602	1·600	1·597	1·595
4′ 8″	V	5·704	5·408	5·096	4·761	4·396	4·011	3·801
	Q	129·0	122·3	115·3	107·7	99·44	90·73	85·98
	C	1·614	1·613	1·612	1·610	1·608	1·605	1·603
5′ 0″	V	5·964	5·654	5·328	4·977	4·602	4·196	3·977
	Q	154·8	146·8	138·3	129·2	119·5	108·9	103·2
	C	1·630	1·629	1·628	1·626	1·624	1·622	1·620
5′ 4″	V	6·213	5·890	5·550	5·189	4·797	4·374	4·145
	Q	183·5	174·0	163·9	153·3	141·7	129·2	122·4
	C	1·644	1·643	1·642	1·641	1·639	1·637	1·635
5′ 6″	V	6·335	6·006	5·659	5·290	4·892	4·460	4·227
	Q	199·0	188·7	177·8	166·2	153·7	140·1	132·8
	C	1·651	1·650	1·649	1·648	1·646	1·644	1·642
5′ 8″	V	6·458	6·123	5·770	5·394	4·987	4·547	4·309
	Q	215·4	204·2	192·2	179·9	166·3	151·6	143·7
	C	1·658	1·657	1·656	1·655	1·653	1·651	1·649
6′ 0″	V	6·695	6·351	5·983	5·594	5·173	4·717	4·469
	Q	250·3	237·5	223·6	209·2	193·4	176·4	167·1
	C	1·670	1·670	1·669	1·668	1·666	1·664	1·662

The coefficients (C) are assumed to remain constant for all values of S

TABLE VI.

(Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

cement, in perfect order, running just full.

Pegtop Section.

N=0·010.

Transverse Diameter.		S per thousand. 0·4	0·35	0·3	0·25	0·2	0·15	0·1
4′ 0″	V	3·235	3·020	2·788	2·537	2·255	1·935	1·553
	Q	53·77	50·20	46·34	42·17	37·47	32·16	25·80
	C	1·563	1·560	1·555	1·551	1·540	1·526	1·500
4′ 4″	V	3·410	3·184	3·006	2·675	2·377	2·042	1·644
	Q	66·49	62·08	58·61	52·17	46·36	39·81	31·99
	C	1·583	1·580	1·575	1·571	1·561	1·548	1·523
4′ 6″	V	3·497	3·268	3·083	2·745	2·440	2·096	1·684
	Q	73·54	68·72	64·84	57·72	51·31	44·07	35·42
	C	1·593	1·591	1·585	1·581	1·572	1·558	1·534
4′ 8″	V	3·578	3·344	3·081	2·810	2·498	2·143	1·727
	Q	80·93	75·64	69·69	63·56	56·50	48·47	39·06
	C	1·601	1·599	1·594	1·590	1·581	1·568	1·545
5′ 0″	V	3·744	3·496	3·228	2·941	2·616	2·249	1·812
	Q	97·10	90·76	83·80	76·35	67·91	58·38	47·04
	C	1·618	1·615	1·611	1·607	1·599	1·587	1·565
5′ 4″	V	3·903	3·647	3·368	3·066	2·729	2·348	1·893
	Q	115·3	107·7	99·49	90·57	80·61	69·36	55·92
	C	1·633	1·631	1·627	1·623	1·615	1·604	1·584
5′ 6″	V	3·980	3·718	3·435	3·128	2·785	2·397	1·932
	Q	125·1	116·8	107·9	98·28	87·50	75·31	60·70
	C	1·640	1·638	1·635	1·631	1·623	1·613	1·593
5′ 8″	V	4·057	3·790	3·502	3·193	2·841	2·446	1·977
	Q	135·3	126·4	116·8	106·5	94·75	81·57	65·93
	C	1·647	1·645	1·642	1·639	1·631	1·621	1·602
6′ 0″	V	4·208	3·933	3·634	3·311	2·949	2·541	2·052
	Q	157·3	147·1	135·9	123·8	110·3	95·01	76·72
	C	1·660	1·658	1·655	1·652	1·645	1·636	1·618

above 1 per thousand; also again when R is less than 0·1 foot.

TABLE VII.

MEAN VELOCITIES OF DISCHARGE (V), IN FEET PER SECOND; QUANTITIES DISCHARGED (Q), IN CUBIC FEET PER SECOND; AND COEFFICIENTS (C) OF MEAN VELOCITY.

FOR CULVERTS AND PIPES, OF VARIOUS SECTIONS, IN CAST OR WROUGHT IRON, NEW BRICKWORK, OR ASHLAR, OR UNGLAZED STONEWARE, IN PERFECT ORDER, RUNNING FULL BUT NOT UNDER PRESSURE; WHEN N, THE COEFFICIENT OF ROUGHNESS OF IRREGULARITY, $=0{\cdot}013$.

GENERAL FORMULA, $Q = A.V = A.C.100\sqrt{RS}$.

TABLE VII.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts and Pipes, of Cast or Wrought Iron, or Unglazed Stone-

Cylindrical Pipes.

N=0·013.

Diameter.		S per thousand. 20	17·5	15	12·5	10	9	8
3 inches	V	2·298	2·150	1·990	1·817	1·625	1·541	1·453
	Q	0·113	0·106	0·098	0·089	0·080	0·076	0·071
	C	0·650	...	...	...	...	...	0·650
4 inches	V	2·654	2·482	2·298	2·098	1·876	1·780	1·678
	Q	0·231	0·216	0·200	0·183	0·164	0·155	0·146
	C	0·650	...	...	...	...	...	0·650
6 inches	V	3·510	3·283	3·040	2·774	2·482	2·355	2·220
	Q	0·689	0·644	0·597	0·545	0·487	0·462	0·436
	C	0·702	...	...	...	...	...	0·702
8 inches	V	4·241	4·110	3·805	3·473	3·106	2·947	2·778
	Q	1·480	1·434	1·328	1·212	1·084	1·029	0·970
	C	0·761	...	...	...	...	...	0·761
9 inches	V	4·843	4·531	4·196	3·830	3·425	3·249	3·064
	Q	2·140	2·002	1·854	1·692	1·513	1·435	1·354
	C	0·791	...	...	...	...	...	0·791
10 inches	V	5·235	4·896	4·533	4·139	3·701	3·497	3·311
	Q	2·855	2·670	2·472	2·257	2·019	1·907	1·806
	C	0·811	...	...	...	...	...	0·811
12 inches	V	6·032	5·642	5·223	4·768	4·265	4·046	3·815
	Q	4·737	4·431	4·102	3·745	3·350	3·178	2·996
	C	0·853	...	...	...	...	...	0·853
15 inches	V	7·147	6·685	6·191	5·650	5·053	4·794	4·520
	Q	8·771	8·204	7·597	6·934	6·201	5·883	5·547
	C	0·904	...	...	...	...	...	0·904
18 inches	V	8·192	7·664	7·095	6·476	5·793	5·495	5·178
	Q	14·48	13·54	12·54	11·44	10·24	9·710	9·150
	C	0·946	...	...	...	...	...	0·946

The coefficients (C) are assumed to remain constant for all values of S or when R

TABLE VII.

(Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

ware, or in new Brickwork, or Ashlar, in perfect order, running full.

Cylindrical Pipes.

N=0·013.

Diameter.		S per thousand. 7	6	5	4	3	2	1
3 inches	V	1·359	1·258	1·149	1·028	0·890	0·727	0·514
	Q	0·067	0·062	0·056	0·050	0·044	0·036	0·025
	C	0·650						0·650
4 inches	V	1·570	1·453	1·327	1·186	1·028	0·839	0·593
	Q	0·137	0·127	0·116	0·103	0·090	0·073	0·052
	C	0·650						0·650
6 inches	V	2·077	1·921	1·755	1·570	1·359	1·110	0·785
	Q	0·408	0·377	0·345	0·308	0·267	0·218	0·154
	C	0·702						0·702
8 inches	V	2·599	2·406	2·197	1·966	1·702	1·390	0·982
	Q	0·907	0·840	0·767	0·686	0·594	0·485	0·343
	C	0·761						0·761
9 inches	V	2·866	2·653	2·422	2·177	1·875	1·532	1·083
	Q	1·266	1·172	1·070	0·962	0·828	0·677	0·478
	C	0·791						0·791
10 inches	V	3·096	2·868	2·618	2·341	2·028	1·656	1·170
	Q	1·689	1·564	1·428	1·277	1·106	0·903	0·638
	C	0·811						0·811
12 inches	V	3·568	3·304	3·016	2·698	2·336	1·907	1·349
	Q	2·802	2·595	2·369	2·119	1·835	1·498	1·059
	C	0·853						0·853
15 inches	V	4·228	3·914	3·574	3·197	2·768	2·260	1·598
	Q	5·189	4·803	4·386	3·923	3·397	2·773	1·961
	C	0·904						0·904
18 inches	V	4·846	4·487	4·096	3·664	3·173	2·590	1·832
	Q	8·563	7·929	7·238	6·475	5·607	4·577	3·237
	C	0·946						0·946

above 1 per thousand; also again for all diameters below 5 inche
is less than 0·1 foot.

TABLE VII.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts and Pipes, of Cast or Wrought Iron, or Unglazed Stone-

Cylindrical Pipes.

N=0·013.

Diameter in feet.		S per thousand. 5	4·5	4	3·5	3	2·5	2
1·5	V	4·079	3·886	3·664	3·427	3·173	2·897	2·590
	Q	7·238	6·878	6·474	6·057	5·606	5·118	4·577
	C	0·946	.....	.....	.....	.....	.....	0·946
1·75	V	4·593	4·357	4·108	3·843	3·558	3·247	2·905
	Q	11·0	10·48	9·880	9·241	8·557	7·810	6·986
	C	0·982	.....	.....	.....	.....	.....	0·982
2·	V	5·055	4·796	4·521	4·229	3·916	3·575	3·197
	Q	15·88	15·06	14·20	13·29	12·30	11·23	10·04
	C	1·011	.....	.....	.....	.....	.....	1·011
2·25	V	5·505	5·222	4·923	4·606	4·264	3·976	3·481
	Q	21·89	20·76	19·57	18·31	16·95	15·48	13·84
	C	1·038	.....	.....	.....	.....	.....	1·038
2·5	V	5·937	5·632	5·310	4·967	4·598	4·197	3·754
	Q	29·14	27·65	26·07	24·38	22·57	20·60	18·43
	C	1·062	.....	.....	.....	.....	.....	1·062
2·75	V	6·350	6·024	5·679	5·312	4·918	4·489	4·016
	Q	37·71	35·77	33·73	31·55	29·21	26·66	23·85
	C	1·083	.....	.....	.....	.....	.....	1·083
3·	V	6·747	6·401	6·036	5·646	5·227	4·772	4·268
	Q	47·70	45·25	42·67	39·91	36·95	33·80	30·17
	C	1·102	.....	.....	.....	.....	.....	1·102
3·5	V	7·513	7·128	6·721	6·287	5·820	5·313	4·753
	Q	72·29	68·58	64·66	60·48	55·99	51·12	45·73
	C	1·136	.....	.....	.....	.....	.....	1·136
4·	V	8·238	7·815	7·369	6·892	6·381	5·825	5·210
	Q	103·6	98·23	92·63	86·61	80·18	73·20	65·47
	C	1·165	.....	.....	.....	.....	.....	1·165

The coefficients (C) are assumed to remain constant for all values of S or when R

TABLE VII.

(Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

ware, or in new Brickwork, or Ashlar, in perfect order, running full.

Cylindrical Pipes.

N=0·013.

Diameter in feet.		S per thousand. 1·5	1·	0·9	0·8	0·7	0·6	0·5
1·5	V	2·584	1·833	1·736	1·633	1·525	1·405	1·276
	Q	4·565	3·238	3·068	2·886	2·694	2·483	2·255
	C	0·946	0·946	0·945	0·943	0·941	0·937	0·932
1·75	V	2·515	2·053	1·946	1·832	1·710	1·578	1·430
	Q	6·048	4·938	4·681	4·405	4·112	3·795	3·447
	C	0·982	0·982	0·981	0·979	0·977	0·974	0·969
2·	V	2·769	2·261	2·142	2·016	1·882	1·737	1·579
	Q	8·698	7·102	6·729	6·332	5·912	5·457	4·961
	C	1·011	1·011	1·010	1·008	1·006	1·003	0·999
2·25	V	3·014	2·461	2·333	2·195	2·049	1·892	1·721
	Q	11·99	9·785	9·277	8·728	8·149	7·523	6·841
	C	1·038	1·038	1·037	1·035	1·033	1·030	1·026
2·5	V	3·251	2·655	2·516	2·368	2·211	2·042	1·856
	Q	15·96	13·03	12·35	11·62	10·85	10·02	9·112
	C	1·062	1·062	1·061	1·059	1·057	1·054	1·050
2·75	V	3·479	2·840	2·691	2·535	2·367	2·185	1·987
	Q	20·66	16·86	15·98	15·06	14·06	12·98	11·80
	C	1·083	1·083	1·082	1·081	1·079	1·076	1·072
3·	V	3·696	3·018	2·860	2·694	2·516	2·323	2·116
	Q	26·13	21·34	20·22	19·04	17·78	16·42	14·96
	C	1·102	1·102	1·101	1·100	1·098	1·095	1·092
3·5	V	4·116	3·360	3·185	3·001	2·802	2·590	2·358
	Q	39·60	32·33	30·64	28·87	26·96	24·92	22·68
	C	1·136	1·136	1·135	1·134	1·132	1·130	1·127
4·	V	4·512	3·684	3·492	3·289	3·072	2·838	2·585
	Q	56·70	46·29	43·88	41·33	38·60	35·67	32·48
	C	1·165	1·165	1·164	1·163	1·161	1·159	1·156

above 1 per thousand; also again for all diameters below 5 inches; is less than 0·1 foot.

TABLE VII.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts and Pipes, of Cast or Wrought Iron, or Unglazed Stone-

Cylindrical Pipes.

N=0·013.

Diameter in feet.		S per thousand. 1·	0·9	0·8	0·7	0·6	0·5	0·45
4·	V	3·684	3·492	3·289	3·072	2·838	2·585	2·448
	Q	46·29	43·88	41·33	38·60	35·67	32·48	30·76
	C	1·165	1·164	1·163	1·161	1·159	1·156	1·154
4·5	V	3·991	3·783	3·564	3·331	3·079	2·803	2·655
	Q	63·47	60·16	56·68	52·98	48·97	44·58	42·23
	C	1·190	1·189	1·188	1·187	1·185	1·182	1·180
5·	V	4·286	4·062	3·826	3·576	3·306	3·010	2·854
	Q	84·16	79·76	75·12	70·21	64·91	59·10	56·04
	C	1·212	1·211	1·210	1·209	1·207	1·204	1·203
5·5	V	4·568	4·331	4·080	3·812	3·524	3·209	3·042
	Q	108·5	102·9	96·93	90·57	83·72	76·24	72·27
	C	1·232	1·231	1·230	1·229	1·227	1·224	1·223
6·	V	4·837	4·585	4·320	4·037	3·735	3·405	3·227
	Q	136·8	129·6	122·1	114·1	105·6	96·27	91·24
	C	1·249	1·248	1·247	1·246	1·245	1·243	1·242
6·5	V	5·099	4·834	4·553	4·255	3·937	3·588	3·402
	Q	169·2	160·4	151·1	141·2	130·6	119·1	112·9
	C	1·265	1·264	1·263	1·262	1·261	1·259	1·258
7·	V	5·350	5·076	4·782	4·470	4·134	3·768	3·572
	Q	205·9	195·3	184·0	172·0	159·1	145·0	137·5
	C	1·279	1·279	1·278	1·277	1·276	1·274	1·273
7·5	V	5·599	5·312	5·004	4·677	4·327	3·944	3·737
	Q	247·4	234·7	221·1	206·6	191·2	174·2	165·1
	C	1·293	1·293	1·292	1·291	1·290	1·288	1·287
8·	V	5·836	5·537	5·216	4·876	4·510	4·114	3·900
	Q	293·3	278·3	262·2	245·1	226·7	206·8	196·0
	C	1·305	1·305	1·304	1·303	1·302	1·301	1·300

The coefficients (C) are assumed to remain constant for all values of S or when R

TABLE VII.

(Q), and Coefficients (C) of Mean Velocity,

ware, or in new Brickwork, or Ashlar, in perfect order, running full.

Cylindrical Pipes.

N=0·013.

Diameter in feet.		S per thousand. 0·4	0·35	0·3	0·25	0·2	0·15	0·1
4·	V	2·304	2·152	1·983	1·802	1·599	1·371	1·097
	Q	28·95	27·04	24·92	22·64	20·09	17·23	13·78
	C	1·152	1·150	1·145	1·140	1·131	1·119	1·097
4·5	V	2·499	2·333	2·151	1·955	1·739	1·491	1·195
	Q	39·74	37·10	34·21	31·09	27·66	23·71	19·01
	C	1·178	1·176	1·171	1·166	1·159	1·148	1·127
5·	V	2·685	2·508	2·314	2·104	1·872	1·606	1·291
	Q	52·72	49·24	45·44	41·31	36·76	31·53	25·35
	C	1·201	1·199	1·195	1·191	1·184	1·173	1·155
5·5	V	2·863	2·673	2·470	2·249	2·000	1·717	1·382
	Q	68·02	63·51	58·68	53·43	47·52	40·79	32·83
	C	1·221	1·219	1·216	1·213	1·206	1·196	1·179
6·	V	3·037	2·856	2·619	2·385	2·123	1·826	1·471
	Q	85·87	80·75	74·05	67·43	60·03	51·63	41·59
	C	1·240	1·238	1·235	1·232	1·226	1·217	1·201
6·5	V	3·204	2·993	2·764	2·517	2·243	1·949	1·557
	Q	106·3	99·32	91·72	83·52	74·43	64·01	51·67
	C	1·257	1·255	1·252	1·249	1·244	1·236	1·222
7·	V	3·366	3·143	2·905	2·946	2·357	2·030	1·641
	Q	129·5	121·0	111·8	101·8	90·71	78·12	63·15
	C	1·272	1·270	1·268	1·265	1·260	1·253	1·240
7·7	V	3·521	3·288	3·040	2·771	2·472	2·128	1·722
	Q	155·6	145·3	134·3	122·4	109·2	94·01	76·08
	C	1·286	1·284	1·282	1·280	1·276	1·269	1·258
8·	V	3·674	3·435	3·174	2·893	2·580	2·224	1·801
	Q	184·7	172·7	159·5	145·4	129·7	111·8	90·53
	C	1·299	1·298	1·296	1·294	1·290	1·284	1·274

above 1 per thousand; also again for all diameters below 5 inches; is less than 0·1 foot.

TABLE VII.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts, of Cast or Wrought Iron, or Unglazed Stone-

Hawksley's Ovoid.

N=0·013.

Transverse Diameter.		S per thousand. 20	17·5	15	12·5	10	9	8
1′ 0″	V	6·528	6·106	5·653	5·160	4·616	4·379	4·128
	Q	6·498	6·078	5·628	5·137	4·595	4·359	4·110
	C	0·877	...	...	...	...	...	0·877
1′ 2″	V	7·330	6·856	6·348	5·795	5·183	4·918	4·636
	Q	9·932	9·290	8·602	7·852	7·023	6·663	6·281
	C	0·912	...	...	...	...	...	0·912
1′ 4″	V	8·093	7·570	7·009	6·397	5·723	5·429	5·118
	Q	14·32	13·40	12·40	10·86	10·13	9·609	9·059
	C	0·942	...	...	...	...	...	0·942
1′ 6″	V	8·828	8·258	7·645	6·979	6·242	5·922	5·583
	Q	19·79	18·51	17·14	15·65	14·00	13·28	12·52
	C	0·969	...	...	...	...	...	0·969
1′ 8″	V	9·535	8·919	8·258	7·538	6·743	6·396	6·031
	Q	26·36	24·26	22·83	20·84	18·64	17·69	16·67
	C	0·993	...	...	...	...	...	0·993
1′ 10″	V	10·21	9·551	8·843	8·073	7·220	6·850	6·458
	Q	34·16	31·96	29·59	27·00	24·16	22·92	21·61
	C	1·014	...	...	...	...	...	1·014
2′ 0″	V	10·87	10·17	9·418	8·597	7·689	7·295	6·877
	Q	43·28	40·50	37·50	34·23	30·62	29·05	27·39
	C	1·034	...	...	...	...	...	1·034
2′ 2″	V	11·51	10·77	9·972	9·103	8·143	7·724	7·282
	Q	53·81	50·33	46·60	42·54	38·05	36·09	34·03
	C	1·052	...	...	...	...	...	1·052
2′ 4″	V	12·14	11·36	10·52	9·599	8·585	8·145	7·679
	Q	65·81	61·56	56·99	52·02	46·53	44·14	41·62
	C	1·069	...	...	...	...	...	1·069

The coefficients (C) are assumed to remain constant for all values of S

TABLE VII.

(Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

ware, or in new Brickwork, or Ashlar, in perfect order, running full.

Hawksley's Ovoid.

N=0·013.

Transverse Diameter.		S per thousand. 7	6	5	4	3	2	1
1′ 0″	V	3·861	3·576	3·264	2·920	2·528	2·064	1·459
	Q	3·844	3·559	3·250	2·906	2·517	2·055	1·453
	C	0·877						0·877
1′ 2″	V	4·337	4·015	3·665	3·278	2·839	2·318	1·639
	Q	5·876	5·440	4·967	4·441	3·847	3·141	2·221
	C	0·912						0·912
1′ 4″	V	4·787	4·432	4·046	3·619	3·134	2·559	1·810
	Q	8·473	7·845	7·161	6·406	5·547	4·530	3·203
	C	0·942						0·942
1′ 6″	V	5·223	4·835	4·414	3·948	3·419	2·792	1·974
	Q	11·71	10·84	9·896	8·851	7·665	6·259	4·425
	C	0·969						0·969
1′ 8″	V	5·641	5·222	4·767	4·264	3·693	3·015	2·132
	Q	15·60	14·44	13·18	11·79	10·21	8·336	5·895
	C	0·993						0·993
1′ 10″	V	6·040	5·592	5·106	4·566	3·955	3·229	2·284
	Q	20·21	18·71	17·08	15·28	13·23	10·80	7·641
	C	1·014						1·014
2′ 0″	V	6·434	5·956	5·437	4·863	4·212	3·433	2·432
	Q	25·62	23·72	21·65	19·36	16·77	13·69	9·684
	C	1·034						1·034
2′ 2″	V	6·812	6·307	5·758	5·150	4·459	3·641	2·574
	Q	31·83	29·47	26·91	24·06	20·84	16·01	12·03
	C	1·052						1·052
2′ 4″	V	7·183	6·650	6·071	5·429	4·703	3·840	2·715
	Q	38·93	36·04	32·90	29·43	25·49	20·80	14·72
	C	1·069						1·069

above 1 per thousand; also again when R is less than 0·1 foot.

TABLE VII.

Mean Velocities (V), Quantities discharged

For Culverts of Cast or Wrought Iron, or Unglazed Stoneware,

Hawksley's Ovoid.

N=0·013.

Transverse Diameter.		S per thousand. 5	4·5	4	3·5	3	2·5	2
2′ 6″	V	6·382	6·054	5·708	5·339	4·943	4·512	4·036
	Q	39·71	37·68	35·51	33·22	30·75	28·07	25·11
	C	1·085						1·085
2′ 8″	V	6·676	6·333	5·981	5·585	5·171	4·720	4·222
	Q	47·26	44·83	42·34	39·54	36·60	33·41	29·89
	C	1·099						1·099
2′ 10″	V	6·968	6·611	6·233	5·830	5·398	4·927	4·407
	Q	54·98	52·17	49·18	46·00	42·59	38·88	34·77
	C	1·113						1·113
3′ 0″	V	7·247	6·875	6·482	6·064	5·514	5·124	4·583
	Q	65·00	61·66	58·14	54·39	49·45	45·96	41·10
	C	1·125						1·125
3′ 2″	V	7·518	7·133	6·724	6·290	5·823	5·316	4·755
	Q	75·04	71·20	67·12	62·79	58·12	53·06	47·46
	C	1·136						1·136
3′ 4″	V	7·788	7·388	6·966	6·516	6·032	5·507	4·925
	Q	86·13	81·71	77·04	72·07	66·71	60·91	54·47
	C	1·147						1·147
3′ 6″	V	8·056	7·643	7·206	6·471	6·240	5·696	5·095
	Q	98·28	93·24	87·91	82·24	76·13	69·49	62·16
	C	1·158						1·158
3′ 8″	V	8·316	7·890	7·439	6·958	6·441	5·881	5·259
	Q	111·3	105·6	99·56	93·12	86·20	78·70	70·38
	C	1·168						1·168
3′ 10″	V	8·576	8·136	7·671	7·175	6·643	6·063	5·423
	Q	125·4	119·0	112·2	104·9	97·17	88·69	79·33
	C	1·178						1·178

The coefficients (C) are assumed to remain constant for all values of S

TABLE VII.

(Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

or in new Brickwork, or Ashlar, in perfect order, running full.

Hawksley's Ovoid.

N=0·013.

Transverse Diameter.		S per thousand. 1·5	1·0	0·9	0·8	0·7	0·6	0·5
2′ 6″	V	3·496	2·855	2·706	2·546	2·377	2·197	1·998
	Q	21·75	17·76	16·84	15·84	14·79	13·67	12·43
	C	1·085	1·085	1·084	1·082	1·080	1·078	1·074
2′ 8″	V	3·656	2·986	2·829	2·663	2·487	2·297	2·090
	Q	25·88	21·14	20·03	18·85	17·60	16·26	14·79
	C	1·099	1·099	1·098	1·096	1·094	1·092	1·088
2′ 10″	V	3·816	3·116	2·953	2·779	2·596	2·399	2·182
	Q	30·11	24·58	23·30	21·93	20·48	18·93	17·22
	C	1·113	1·113	1·112	1·110	1·108	1·106	1·102
3′ 0″	V	3·969	3·241	3·072	2·891	2·699	2·495	2·269
	Q	35·60	29·07	27·55	25·93	24·21	22·38	20·35
	C	1·125	1·125	1·124	1·122	1·120	1·118	1·114
3′ 2″	V	4·118	3·362	3·187	3·002	2·803	2·590	2·357
	Q	41·10	33·56	31·81	29·96	27·98	25·85	23·53
	C	1·136	1·136	1·135	1·134	1·132	1·130	1·126
3′ 4″	V	42·66	3·482	3·302	3·110	2·904	2·684	2·443
	Q	47·18	38·51	36·52	34·40	32·12	29·68	27·02
	C	1·147	1·147	1·146	1·145	1·143	1·141	1·138
3′ 6″	V	4·413	3·602	3·415	3·217	3·004	2·776	2·528
	Q	53·84	43·94	41·66	39·25	36·65	33·87	30·84
	C	1·158	1·158	1·157	1·156	1·154	1·152	1·149
3′ 8″	V	4·555	3·719	3·525	3·321	3·101	2·867	2·610
	Q	60·96	49·77	47·17	44·44	41·50	38·37	34·93
	C	1·168	1·168	1·167	1·166	1·164	1·162	1·159
3′ 10″	V	4·697	3·835	3·636	3·424	3·198	2·956	2·691
	Q	68·71	56·10	53·19	50·09	46·78	43·24	39·36
	C	1·178	1·178	1·177	1·176	1·174	1·172	1·169

above 1 per thousand ; also again when R is less than 0·1 foot.

TABLE VII.

Mean Velocities (V), Quantities discharged

For Culverts of Cast or Wrought Iron, or Unglazed Stoneware,

Hawksley's Ovoid.

N=0·013.

Transverse Diameter.		S per thousand. 1·	0·9	0·8	0·7	0·6	0·5	0·45
4′ 0″	V	3·945	3·758	3·522	3·291	3·042	2·770	2·624
	Q	62·84	59·86	56·10	52·42	48·46	44·15	41·80
	C	1·186	1·185	1·184	1·183	1·181	1·178	1·176
4′ 4″	V	4·166	3·948	3·719	3·476	3·213	2·925	2·774
	Q	77·86	73·79	69·51	64·97	60·05	54·67	51·85
	C	1·203	1·202	1·201	1·200	1·198	1·195	1·194
4′ 6″	V	4·272	4·050	3·815	3·566	3·296	3·001	2·845
	Q	86·20	81·73	76·99	71·96	66·51	60·56	57·41
	C	1·211	1·210	1·209	1·208	1·206	1·203	1·202
4′ 8″	V	4·376	4·149	3·908	3·652	3·376	3·077	2·916
	Q	94·87	89·95	84·72	79·17	73·19	66·71	63·22
	C	1·218	1·217	1·216	1·215	1·213	1·211	1·210
5′ 0″	V	4·585	4·346	4·094	3·826	3·538	3·224	3·056
	Q	114·1	108·2	101·9	95·23	88·06	80·24	76·06
	C	1·233	1·232	1·231	1·230	1·228	1·226	1·225
5′ 4″	V	4·786	4·537	4·273	3·994	3·692	3·365	3·189
		135·5	128·5	121·0	113·1	104·5	95·30	90·31
	C	1·246	1·245	1·244	1·243	1·241	1·239	1·238
5′ 6″	V	4·879	4·625	4·392	4·105	3·797	3·461	3·280
	Q	146·9	139·2	132·2	123·6	114·3	104·2	98·76
	C	1·251	1·250	1·249	1·248	1·247	1·245	1·244
5′ 8″	V	4·980	4·720	4·447	4·156	3·845	3·504	3·321
	Q	157·2	149·0	140·3	131·2	121·3	110·6	104·8
	C	1·258	1·257	1·256	1·255	1·254	1·252	1·251
6′ 0″	V	5·170	4·905	4·602	4·319	3·995	3·641	3·452
	Q	185·3	175·8	164·9	154·8	143·2	130·5	127·7
	C	1·269	1·269	1·268	1·267	1·266	1·264	1·263

The coefficients (C) are assumed to remain constant for all values of S

TABLE VII.

(Q), and Coefficients (C) of Mean Velocity,

or in new Brickwork, or Ashlar, in perfect order, running full.

Hawksley's Ovoid.

N=0·013.

Transverse Diameter.		S per thousand. 0·4	0·35	0·3	0·25	0·2	0·15	0·1
	V	2·469	2·303	2·125	1·932	1·717	1·473	1·181
4′ 0″	Q	39·33	36·69	33·85	30·78	27·35	23·46	18·81
	C	1·174	1·171	1·167	1·162	1·155	1·144	1·123
	V	2·610	2·437	2·250	2·044	1·818	1·559	1·253
4′ 4″	Q	48·78	45·55	42·05	38·20	33·98	29·14	23·42
	C	1·192	1·190	1·186	1·181	1·174	1·163	1·144
	V	2·678	2·500	2·308	2·099	1·867	1·601	1·288
4′ 6″	Q	54·04	50·45	46·57	42·36	37·68	32·31	25·99
	C	1·200	1·198	1·194	1·190	1·183	1·172	1·154
	V	2·744	2·564	2·365	2·149	1·914	1·643	1·321
4′ 8″	Q	59·49	55·59	51·27	46·59	41·49	35·62	28·64
	C	1·208	1·206	1·202	1·198	1·191	1·181	1·163
	V	2·876	2·686	2·481	2·260	2·010	1·725	1·395
5′ 0″	Q	71·58	66·85	61·75	56·25	50·03	42·93	34·72
	C	1·223	1·221	1·218	1·215	1·208	1·198	1·181
	V	3·002	2·804	2·590	2·358	2·099	1·804	1·454
5′ 4″	Q	85·02	79·41	73·35	66·78	59·44	51·09	41·18
	C	1·236	1·234	1·231	1·228	1·222	1·213	1·197
	V	3·090	2·886	2·644	2·408	2·143	1·844	1·486
5′ 6″	Q	93·04	86·90	79·61	72·50	64·52	55·52	44·74
	C	1·243	1·241	1·238	1·235	1·229	1·220	1·205
	V	3·130	2·923	2·699	2·458	2·188	1·882	1·518
5′ 8″	Q	98·78	92·25	85·18	77·57	69·05	59·39	47·91
	C	1·250	1·248	1·245	1·242	1·236	1·228	1·213
	V	3·252	3·037	2·806	2·554	2·276	1·958	1·580
6′ 0″	Q	116·5	108·8	100·6	91·53	81·57	70·17	56·63
	C	1·262	1·260	1·257	1·254	1·249	1·241	1·227

above 1 per thousand; also again when R is less than 0·1 foot.

TABLE VII.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts of Cast or Wrought Iron, or Unglazed Stoneware,

Metropolitan Ovoid.

N=0·013.

Transverse Diameter.		S per thousand. 20	17·5	15	12·5	10	9	8
1′ 0″	V	6·771	6·333	5·863	5·353	4·787	4·542	4·282
	Q	7·780	7·277	6·736	6·150	5·500	5·218	4·920
	C	0·889						0·889
1′ 2″	V	7·589	7·099	6·572	5·999	5·366	5·090	4·800
	Q	8·773	8·206	7·597	6·935	6·203	5·884	5·549
	C	0·923						0·923
1′ 4″	V	8·373	7·833	7·251	6·619	5·921	5·617	5·296
	Q	17·10	15·99	14·81	13·51	12·09	11·47	10·81
	C	0·953						0·953
1′ 6″	V	9·131	8·541	7·907	7·218	6·456	6·125	5·774
	Q	23·59	22·07	20·43	18·65	16·68	15·83	14·92
	C	0·980						0·980
1′ 8″	V	9·868	9·230	8·546	7·801	6·978	6·619	6·241
	Q	31·48	29·44	27·26	24·88	22·26	21·11	19·91
	C	1·004						1·004
1′ 10″	V	10·56	9·881	9·148	8·351	7·469	7·086	6·681
	Q	40·76	38·14	35·31	32·23	28·83	27·35	25·79
	C	1·025						1·025
2′ 0″	V	11·24	10·52	9·738	8·890	7·951	7·544	7·112
	Q	51·64	48·33	44·74	40·84	36·53	34·66	32·67
	C	1·045						1·045
2′ 2″	V	11·90	11·14	10·32	9·418	8·424	7·992	7·534
	Q	64·16	60·07	55·64	50·78	45·42	43·09	40·62
	C	1·063						1·063
2′ 4″	V	12·55	11·74	10·86	9·918	8·871	8·416	7·935
	Q	78·47	73·41	67·91	62·02	55·47	52·62	49·62
	C	1·079						1·079

The coefficients (C) are assumed to remain constant for all values of S

TABLE VII.

(Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

or in new Brickwork, or Ashlar, in perfect order, running full.

Metropolitan Ovoid.

N=0·013.

Transverse Diameter.		S per thousand. 7	6	5	4	3	2	1
1′ 0″	V	4·006	3·708	3·385	3·028	2·622	2·141	1·514
	Q	4·603	4·260	3·889	3·479	3·013	2·460	1·739
	C	0·889						0·889
1′ 2″	V	4·489	4·156	3·794	3·394	2·939	2·400	1·696
	Q	5·189	4·804	4·386	3·923	3·397	2·774	1·960
	C	0·923						0·923
1′ 4″	V	4·954	4·586	4·186	3·744	3·243	3·647	1·873
	Q	10·12	9·365	8·548	7·645	6·622	5·405	3·825
	C	0·953						0·952
1′ 6″	V	5·402	5·001	4·565	4·084	3·536	2·887	2·041
	Q	13·96	12·92	11·79	10·55	9·137	7·460	5·274
	C	0·980						0·980
1′ 8″	V	5·838	5·405	4·934	4·412	3·822	3·120	2·207
	Q	18·62	17·24	15·74	14·07	12·19	9·953	7·040
	C	1·004						1·004
1′ 10″	V	6·249	5·785	5·282	4·724	4·091	3·340	2·362
	Q	24·12	22·33	20·39	18·23	15·79	12·89	9·117
	C	1·025						1·025
2′ 0″	V	6·652	6·159	5·623	5·028	4·355	3·556	2·514
	Q	30·56	28·29	25·83	23·10	20·01	16·34	11·55
	C	1·045						1·045
2′ 2″	V	7·048	6·525	5·957	5·328	4·614	3·767	2·664
	Q	38·00	35·18	32·12	28·73	24·88	20·31	14·36
	C	1·063						1·063
2′ 4″	V	7·422	6·872	6·273	5·611	4·859	3·967	2·805
	Q	46·41	42·97	39·22	35·08	30·38	24·80	17·54
	C	1·079						1·079

above 1 per thousand; also again when R is less than 0·1 foot.

TABLE VII.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts of Cast or Wrought Iron, or Unglazed Stoneware,

Metropolitan Ovoid.

N=0·013.

Transverse Diameter.		S per thousand. 5·	4·5	4	3·5	3	2·5	2·
2′ 6″	V	6·589	6·250	5·892	5·512	5·103	4·658	4·166
	Q	47·29	44·86	42·29	39·56	36·63	33·43	29·90
	C	1·095						1·095
2′ 8″	V	6·895	6·540	6·167	5·768	5·341	4·874	4·360
	Q	56·31	53·41	50·36	47·12	43·62	39·80	35·61
	C	1·109						1·109
2′ 10″	V	7·189	6·819	6·430	6·014	5·568	5·082	4·546
	Q	66·28	56·04	59·28	55·45	51·34	46·86	41·91
	C	1·122						1·122
3′ 0″	V	7·482	7·098	6·692	6·259	5·795	5·291	4·732
	Q	77·36	73·39	69·19	64·72	59·92	54·71	48·93
	C	1·135						1·135
3′ 2″	V	7·759	7·362	6·940	6·503	6·011	5·488	4·908
	Q	89·36	84·79	79·93	74·89	69·23	63·20	57·22
	C	1·146						1·146
3′ 4″	V	8·058	7·635	7·198	6·734	6·233	5·690	5·089
	Q	102·8	97·43	91·85	85·93	79·54	72·61	64·94
	C	1·158						1·158
3′ 6″	V	8·316	7·890	7·439	6·958	6·441	5·881	5·259
	Q	117·0	111·0	104·6	97·89	90·62	82·74	73·99
	C	1·168						1·168
3′ 8″	V	8·584	8·143	76·78	7·182	6·649	6·070	5·429
	Q	132·3	125·5	118·3	110·7	102·5	93·54	83·66
	C	1·178						1·178
3′ 10″	V	8·847	8·392	7·912	7·401	6·852	6·255	5·595
	Q	149·3	141·6	133·5	124·9	115·6	105·6	94·44
	C	1·187						1·187

The coefficients (C) are assumed to remain constant for all values of S

TABLE VII.

(Q), and Coefficients (C) of Mean Velocity,

or in new Brickwork, or Ashlar, in perfect order, running full.

Metropolitan Ovoid.

N=0·013.

Transverse Diameter.		S per thousand. 1·5	1	0·9	0·8	0·7	0·6	0·5
2′ 6″	V	3·608	2·947	2·793	2·628	2·453	2·267	2·063
	Q	25·90	21·15	20·05	18·86	17·61	16·27	14·81
	C	1·095	1·095	1·094	1·092	1·090	1·088	1·084
2′ 8″	V	3·775	3·083	2·923	2·763	2·570	2·376	2·161
	Q	30·83	25·18	23·87	22·48	20·99	19·40	17·64
	C	1·109	1·109	1·108	1·107	1·105	1·103	1·099
2′ 10″	V	3·938	3·214	3·047	2·870	2·680	2·476	2·253
	Q	36·31	29·63	28·09	26·46	24·71	22·81	20·77
	C	1·122	1·122	1·121	1·120	1·118	1·116	1·112
3′ 0″	V	4·098	3·346	3·172	2·988	2·788	2·577	2·346
	Q	42·37	34·60	32·80	30·89	28·83	26·65	24·26
	C	1·135	1·135	1·134	1·133	1·131	1·129	1·125
3′ 2″	V	4·250	3·470	3·289	3·099	2·894	2·673	2·434
	Q	48·95	39·96	37·88	35·69	33·33	30·84	28·03
	C	1·146	1·146	1·145	1·144	1·142	1·140	1·137
3′ 4″	V	4·408	3·599	3·412	3·214	3·000	2·773	2·525
	Q	56·25	45·93	43·54	41·01	38·28	35·39	32·22
	C	1·158	1·158	1·157	1·156	1·154	1·152	1·149
3′ 6″	V	4·555	3·719	3·525	3·321	3·109	2·867	2·610
	Q	64·08	52·32	49·59	46·72	43·74	40·33	36·72
	C	1·168	1·168	1·167	1·166	1·164	1·162	1·159
3′ 8″	V	4·701	3·839	3·639	3·428	3·201	2·958	2·693
	Q	72·44	59·16	56·08	52·82	49·33	45·58	41·50
	C	1·178	1·178	1·177	1·176	1·174	1·172	1·169
3′ 10″	V	4·845	3·956	3·750	3·532	3·302	3·052	2·779
	Q	81·78	66·78	63·30	59·62	55·74	51·52	46·91
	C	1·187	1·187	1·186	1·185	1·184	1·182	1·179

above 1 per thousand; also again when R is less than 0·1 foot.

TABLE VII.

Mean Velocities (V), Quantities discharged

For Culverts of Cast or Wrought Iron, or Unglazed Stoneware,

Metropolitan Ovoid.

N=0·013.

Transverse Diameter.		S per thousand. 1·	0·9	0·8	0·7	0·6	0·5	0·45
4′ 0″	V	4·071	3·860	3·636	3·398	3·141	2·859	2·709
	Q	74·82	70·95	66·81	62·45	57·73	52·55	49·79
	C	1·196	1·195	1·194	1·193	1·191	1·188	1·186
4′ 4″	V	4·298	4·073	3·838	3·586	3·315	3·018	2·861
	Q	92·71	87·85	82·78	77·35	71·50	65·10	61·71
	C	1·213	1·212	1·211	1·210	1·208	1·205	1·204
4′ 6″	V	4·409	4·180	3·937	3·679	3·401	3·099	2·935
	Q	102·5	97·23	91·57	85·57	79·12	72·08	68·27
	C	1·221	1·220	1·219	1·218	1·216	1·214	1·212
4′ 8″	V	4·515	4·280	4·032	3·768	3·483	3·175	3·010
	Q	112·9	107·0	100·8	94·24	87·12	79·41	75·28
	C	1·228	1·227	1·226	1·225	1·223	1·221	1·220
5′ 0″	V	4·728	4·481	4·222	3·946	3·648	3·325	3·150
	Q	135·7	128·6	121·2	113·3	104·7	95·46	90·44
	C	1·242	1·241	1·240	1·239	1·237	1·235	1·234
5′ 4″	V	4·933	4·676	4·405	4·118	3·809	3·471	3·291
	Q	161·2	152·8	143·9	134·5	124·4	113·8	107·5
	C	1·255	1·254	1·253	1·252	1·251	1·249	1·248
5′ 6″	V	5·033	4·770	4·498	4·200	3·887	3·542	3·357
	Q	174·8	165·7	156·3	145·9	135·0	123·0	116·6
	C	1·261	1·260	1·259	1·258	1·257	1·255	1·254
5′ 8″	V	5·138	4·886	4·584	4·285	3·963	3·613	3·425
	Q	189·5	180·2	169·0	158·0	146·1	133·2	126·3
	C	1·266	1·266	1·265	1·264	1·263	1·261	1·260
6′ 0″	V	5·328	5·054	4·762	4·451	4·117	3·753	3·558
	Q	220·3	209·0	196·9	184·0	170·2	155·2	147·1
	C	1·278	1·278	1·277	1·276	1·275	1·273	1·272

The coefficients (C) are assumed to remain constant for all values of S

TABLE VII.

(Q), and Coefficients (C) of Mean Velocity,

or in new Brickwork, or Ashlar, in perfect order, running full.

Metropolitan Ovoid.

N=0·013.

Transverse Diameter.		S per thousand. 0·4	0·35	0·3	0·25	0·2	0·15	0·1
4′ 0″	V	2·549	2·380	2·197	1·998	1·776	1·522	1·223
	Q	46·85	43·74	40·38	36·72	32·64	27·97	22·48
	C	1·184	1·182	1·178	1·174	1·167	1·155	1·136
4′ 4″	V	2·694	2·515	2·320	2·111	1·877	1·612	1·295
	Q	58·11	54·25	50·04	45·53	40·49	34·77	27·93
	C	1·202	1·200	1·196	1·192	1·185	1·174	1·156
4′ 6″	V	2·764	2·580	2·381	2·167	1·928	1·656	1·331
	Q	64·29	60·01	55·38	50·40	44·84	38·52	30·96
	C	1·210	1·208	1·204	1·200	1·194	1·184	1·166
4′ 8″	V	2·835	2·645	2·441	2·222	1·974	1·697	1·366
	Q	70·90	66·15	61·05	55·57	49·37	42·44	34·16
	C	1·218	1·216	1·212	1·209	1·202	1·192	1·175
5′ 0″	V	2·965	2·770	2·558	2·329	2·073	1·782	1·436
	Q	85·12	79·53	73·44	66·86	59·51	51·16	41·23
	C	1·232	1·230	1·227	1·224	1·218	1·209	1·193
5′ 4″	V	3·097	2·893	2·672	2·433	2·166	1·863	1·503
	Q	101·2	94·51	87·29	79·49	70·76	60·86	49·10
	C	1·246	1·244	1·241	1·238	1·232	1·224	1·209
5′ 6″	V	3·160	2·951	2·728	2·485	2·212	1·903	1·536
	Q	109·8	102·5	94·77	86·33	76·84	66·11	53·36
	C	1·252	1·250	1·248	2·245	1·239	1·231	1·217
5′ 8″	V	3·227	3·013	2·783	2·534	2·258	1·942	1·568
	Q	119·0	111·1	102·6	93·45	83·27	71·62	57·83
	C	1·259	1·257	1·254	1·251	1·246	1·238	1·224
6′ 0″	V	3·352	3·129	2·890	2·633	2·347	2·022	1·633
	Q	138·6	129·4	119·5	108·9	97·05	83·61	67·52
	C	1·271	1·269	1·266	1·263	1·259	1·252	1·239

above 1 per thousand; also again when R is less than 0·1 foot.

TABLE VII.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts of Cast or Wrought Iron, or Unglazed Stoneware,

Pegtop Section.

N=0·013.

Transverse Diameter.		S per thousand. 20	17·5	15	12·5	10	9	8
1′ 0″	V	6·362	5·951	5·509	5·030	4·499	4·268	4·023
	Q	6·610	6·183	5·724	5·226	4·674	4·434	4·180
	C	0·869						0·869
1′ 2″	V	7·141	6·680	6·184	5·645	5·050	4·790	4·516
	Q	10·10	9·445	8·744	7·982	7·141	6·773	6·386
	C	0·904						0·904
1′ 4″	V	7·892	7·382	6·835	6·239	5·581	5·294	4·991
	Q	14·57	13·63	12·62	11·52	10·30	9·773	9·213
	C	0·934						0·934
1′ 6″	V	8·617	8·060	7·462	6·812	6·093	5·780	5·450
	Q	20·14	18·84	17·44	15·92	14·24	13·51	12·74
	C	0·961						0·961
1′ 8″	V	9·323	8·720	8·073	7·370	6·592	6·254	5·896
	Q	26·90	25·16	23·29	21·26	19·02	18·04	17·01
	C	0·986						0·986
1′ 10″	V	10·01	9·362	8·668	7·912	7·077	6·714	6·330
	Q	34·94	32·68	30·26	27·62	24·70	23·44	22·10
	C	1·009						1·009
2′ 0″	V	10·63	9·945	9·209	8·406	7·519	7·133	6·725
	Q	44·16	41·31	38·25	34·92	31·23	29·63	27·93
	C	1·027						1·027
2′ 2″	V	11·25	10·53	9·747	8·898	7·959	7·550	7·118
	Q	54·83	51·32	47·51	43·37	38·79	36·80	34·69
	C	1·045						1·045
2′ 4″	V	11·86	11·10	10·27	9·379	8·389	7·959	7·503
	Q	67·06	62·76	58·07	53·03	47·43	45·00	42·42
	C	1·062						1·062

The coefficients (C) are assumed to remain constant for all values of S

TABLE VII.

(Q), and Coefficients (C) of Mean Velocity,

or in new Brickwork, or Ashlar, in perfect order, running full.

Pegtop Section.

N=0·013.

Transverse Diameter.		S per thousand. 7	6	5	4	3	2	1
1′ 0″	V	3·764	3·485	3·181	2·845	2·464	2·012	1·422
	Q	3·912	3·621	3·305	2·956	2·560	2·090	1·477
	C	0·869						0·869
1′ 2″	V	4·224	3·912	3·571	3·194	2·765	2·258	1·596
	Q	5·973	5·531	5·049	4·516	3·910	3·193	2·257
	C	0·904						0·904
1′ 4″	V	4·669	4·322	3·946	3·529	3·057	2·496	1·764
	Q	8·619	7·978	7·284	6·514	5·643	4·608	3·256
	C	0·934						0·934
1′ 6″	V	5·098	4·719	4·308	3·854	3·337	2·724	1·927
	Q	11·91	11·03	10·07	9·007	7·798	6·366	4·503
	C	0·961						0·961
1′ 8″	V	5·516	5·106	4·662	4·169	3·611	2·948	2·084
	Q	15·91	14·73	13·45	12·03	10·42	8·505	6·012
	C	0·986						0·986
1′ 10″	V	5·922	5·482	5·005	4·476	3·876	3·165	2·238
	Q	20·67	19·14	17·47	15·62	13·53	11·05	7·813
	C	1·009						1·009
2′ 0″	V	6·290	5·824	5·317	4·755	4·118	3·362	2·377
	Q	26·13	24·19	22·09	19·75	17·11	13·96	9·874
	C	1·027						1·027
2′ 2″	V	6·659	6·164	5·627	5·034	4·359	3·559	2·516
	Q	32·45	30·04	27·42	24·53	21·24	17·35	12·26
	C	1·045						1·045
2′ 4″	V	7·019	6·498	5·932	5·306	4·595	3·752	2·653
	Q	39·68	36·74	33·54	30·00	25·98	21·21	15·00
	C	1·062						1·062

above 1 per thousand; also again when R is less than 0·1 foot.

TABLE VII.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts of Cast or Wrought Iron, or Unglazed Stoneware,

Pegtop Section.

N=0·013.

Transverse Diameter.		S per thousand. 5	4·5	4	3·5	3	2·5	2
2′ 6″	V	6·229	5·909	5·571	5·212	4·825	4·404	3·940
	Q	43·24	38·35	36·16	33·83	31·32	28·59	25·57
	C	1·077						1·077
2′ 8″	V	6·525	6·189	5·836	5·459	5·054	4·614	4·127
	Q	48·19	45·70	43·10	40·31	37·32	34·07	30·48
	C	1·092						1·092
2′ 10″	V	6·825	6·476	6·105	5·712	5·287	4·827	4·317
	Q	56·90	53·99	50·90	47·62	44·08	40·24	35·99
	C	1·108						1·108
3′ 0″	V	7·077	6·715	6·330	5·921	5·482	5·004	4·476
	Q	66·15	62·76	59·17	55·34	51·24	46·77	41·84
	C	1·117						1·117
3′ 2″	V	7·357	6·980	6·581	6·156	5·700	5·202	4·653
	Q	76·59	72·66	68·51	64·08	59·34	54·15	48·44
	C	1·130						1·130
3′ 4″	V	7·631	7·240	6·826	6·384	5·911	5·396	4·826
	Q	88·06	83·55	78·77	73·67	68·21	62·27	55·69
	C	1·142						1·142
3′ 6″	V	7·878	7·474	7·046	6·592	6·103	5·571	4·983
	Q	100·2	95·07	89·62	83·85	77·63	70·86	63·38
	C	1·151						1·151
3′ 8″	V	8·142	7·725	7·282	6·813	6·307	5·758	5·150
	Q	113·7	107·8	101·6	95·11	88·04	80·38	71·89
	C	1·162						1·162
3′ 10″	V	8·377	7·948	7·492	7·009	6·489	5·923	5·298
	Q	127·8	121·3	114·3	106·9	99·02	90·38	80·85
	C	1·169						1·169

The coefficients (C) are assumed to remain constant for all values of S

TABLE VII.

(Q), AND COEFFICIENTS (C), OF MEAN VELOCITY.

or in new Brickwork, or Ashlar, in perfect order, running full.

Pegtop Section.

N=0·013.

Transverse Diameter.		S per thousand. 1·5	1·	0·9	0·8	0·7	0·6	0·5
2′ 6″	V	3·411	2·786	2·640	2·484	2·320	2·141	1·949
	Q	22·14	18·08	17·14	16·12	15·06	13·90	12·65
	C	1·077	1·077	1·076	1·074	1·072	1·069	1·066
2′ 8″	V	3·574	2·918	2·766	2·603	2·430	2·246	2·042
	Q	26·39	21·51	20·43	19·22	17·94	16·59	15·08
	C	1·092	1·092	1·091	1·089	1·087	1·085	1·081
2′ 10″	V	3·724	3·052	2·894	2·723	2·542	2·349	2·332
	Q	31·05	25·44	24·13	22·70	21·19	19·58	19·44
	C	1·108	1·108	1·107	1·105	1·103	1·101	1·097
3′ 0″	V	3·877	3·165	3·000	2·826	2·639	2·439	2·218
	Q	36·14	29·58	28·04	26·41	24·67	22·80	20·73
	C	1·117	1·117	1·116	1·115	1·113	1·111	1·107
3′ 2″	V	4·031	3·290	3·119	2·938	2·743	2·536	2·306
	Q	41·96	34·25	32·47	30·58	28·55	26·40	24·00
	C	1·130	1·130	1·129	1·128	1·126	1·124	1·120
3′ 4″	V	4·178	3·412	3·235	3·047	2·845	2·630	2·392
	Q	48·21	39·37	37·33	35·16	32·83	30·35	27·60
	C	1·142	1·142	1·141	1·140	1·138	1·136	1·132
3′ 6″	V	4·316	3·523	3·340	3·146	2·937	2·715	2·471
	Q	54·90	44·81	42·48	40·02	37·36	34·53	31·43
	C	1·151	1·151	1·150	1·149	1·147	1·145	1·142
3′ 8″	V	4·460	3·642	3·452	3·251	3·036	2·806	2·555
	Q	62·26	50·84	48·19	45·38	42·38	39·17	35·67
	C	1·162	1·162	1·161	1·160	1·158	1·156	1·153
3′ 10″	V	4·587	3·747	3·551	3·345	3·123	2·886	2·628
	Q	70·00	57·18	54·19	51·04	47·66	44·04	40·10
	C	1·169	1·169	1·167	1·168	1·165	1·163	1·160

above 1 per thousand; also again when R is less than 0·1 foot.

TABLE VII.

MEAN VELOCITIES (V), QUANTITIES DISCHARGED

For Culverts of Cast or Wrought Iron, or Unglazed Stoneware,

Pegtop Section.

N=0·013.

Transverse Diameter.		S per thousand. 1	0·9	0·8	0·7	0·6	0·5	0·45
4′ 0″	V	3·862	3·661	3·448	3·220	2·976	2·710	2·566
	Q	64·19	60·85	57·31	53·52	49·50	45·08	42·65
	C	1·180	1·179	1·178	1·176	1·174	1·171	1·169
4′ 4″	V	4·074	3·861	3·637	3·400	3·142	2·861	2·710
	Q	79·44	75·29	70·92	66·30	61·27	55·79	52·85
	C	1·196	1·195	1·194	1·193	1·191	1·188	1·186
4′ 6″	V	4·179	3·960	3·732	3·488	3·224	2·936	2·783
	Q	87·88	83·28	78·48	73·35	67·80	61·74	58·53
	C	1·204	1·203	1·202	1·201	1·199	1·196	1·195
4′ 8″	V	4·283	4·060	3·825	3·575	3·300	3·009	2·852
	Q	96·88	91·84	86·52	80·87	74·65	68·06	64·51
	C	1·212	1·211	1·210	1·209	1·207	1·204	1·203
5′ 0″	V	4·376	4·252	4·006	3·744	3·460	3·154	2·990
	Q	113·6	110·4	104·0	97·19	89·82	81·88	7·762
	C	1·226	1·225	1·224	1·223	1·221	1·219	1·218
5′ 4″	V	4·682	4·438	4·181	3·908	3·612	3·292	3·121
	Q	138·3	131·1	123·5	115·4	106·7	97·25	92·19
	C	1·239	1·238	1·237	1·236	1·234	1·232	1·231
5′ 6″	V	4·781	4·532	4·269	3·990	3·688	3·361	3·187
	Q	150·2	142·4	134·1	125·4	115·9	105·6	100·1
	C	1·246	1·245	1·244	1·243	1·241	1·239	1·238
5′ 8″	V	4·873	4·619	4·352	4·067	3·762	3·429	3·251
	Q	162·5	154·0	145·1	135·6	125·5	114·4	108·4
	C	1·251	1·250	1·249	1·248	1·247	1·245	1·244
6′ 0″	V	5·059	4·799	4·521	4·226	3·909	3·564	3·377
	Q	189·2	179·4	169·0	158·0	146·2	133·3	126·3
	C	1·262	1·262	1·261	1·260	1·259	1·257	1·256

The coefficients (C) are assumed to remain constant for all values of S

TABLE VII.

(Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

or in new Brickwork, or Ashlar, in perfect order, running full.

Pegtop Section.

N=0·013.

Transverse Diameter.		S per thousand. 0·4	0·35	0·3	0·25	0·2	0·15	0·1
4′ 0″	V	2·416	2·255	2·082	1·891	1·681	1·440	1·154
	Q	40·15	37·48	34·60	3·143	27·94	23·93	19·18
	C	1·167	1·165	1·161	1·156	1·148	1·136	1·115
4′ 4″	V	2·550	2·382	2·197	1·999	1·777	1·523	1·223
	Q	49·73	46·45	42·84	38·98	34·65	29·70	23·85
	C	1·184	1·182	1·178	1·174	1·167	1·155	1·136
4′ 6″	V	2·619	2·446	2·256	2·052	1·824	1·566	1·257
	Q	55·08	51·44	47·44	43·15	38·36	32·93	26·43
	C	1·193	1·191	1·187	1·182	1·175	1·164	1·145
4′ 8″	V	2·684	2·507	2·298	2·104	1·871	1·603	1·291
	Q	60·71	56·71	51·98	47·59	42·32	36·26	29·20
	C	1·201	1·199	1·195	1·191	1·184	1·173	1·155
5′ 0″	V	2·814	2·628	2·425	2·209	1·963	1·686	1·356
	Q	73·05	68·22	62·95	57·35	50·96	43·77	35·20
	C	1·216	1·214	1·210	1·207	1·200	1·190	1·172
5′ 4″	V	2·937	2·744	2·534	2·306	2·053	1·758	1·421
	Q	86·76	81·06	74·85	68·12	60·65	51·93	41·98
	C	1·229	1·227	1·224	1·221	1·215	1·201	1·189
5′ 6″	V	3·000	2·801	2·586	2·355	2·097	1·803	1·452
	Q	94·26	88·01	81·25	73·99	65·89	56·65	45·62
	C	1·236	1·234	1·231	1·228	1·222	1·213	1·197
5′ 8″	V	3·062	2·859	2·641	2·406	2·141	1·841	1·487
	Q	102·1	95·35	88·08	80·24	71·40	61·40	49·59
	C	1·243	1·241	1·238	1·235	1·229	1·220	1·205
6′ 0″	V	3·179	2·970	2·745	2·499	2·225	1·915	1·546
	Q	118·9	111·0	102·6	93·44	83·19	71·60	57·80
	C	1·254	1·252	1·250	1·247	1·241	1·233	1·219

above 1 per thousand; also again when R is less than 0·1 foot.

TABLE VIII.

Mean Velocities of Discharge (V), in Feet per Second; Quantities discharged (Q), in Cubic Feet per Second; and Coefficients (C) of Mean Velocity.

For Canals, Channels, and Aqueducts of Rectangular Section, in New Rubble, or in Old Brickwork, or Ashlar; when N, the Coefficient of Roughness of Irregularity, $=0{\cdot}017$.

General Formula, $Q = A.V = A.C.100\sqrt{RS}$.

TABLE VIII.

Mean Velocities (V) of Discharge, Quantities dis-

For Canals, Channels, and Aqueducts of Rectangular

For a Bed-width of 2 feet.

N=0·017.

S per thousand.		Depths of water in feet. 0·5	0·75	1·	1·25	1·5	1·75	2·
5·0	V	2·67	3·25	3·65	3·95	4·18	4·37	4·53
	Q	2·67	4·87	7·30	9·87	12·55	15·30	18·10
	C	0·654	0·701	0·730	0·749	0·764	0·775	0·784
3·0	V	2·07	2·51	2·83	3·06	3·24	3·39	3·51
	Q	2·07	3·77	5·65	7·64	9·72	11·85	14·02
	C	0·654	0·701	0·730	0·749	0·764	0·775	0·784
2·0	V	1·69	2·05	2·31	2·50	2·65	2·76	2·86
	Q	1·69	3·08	4·62	6·24	7·94	9·68	11·45
	C	0·654	0·701	0·730	0·749	0·764	0·775	0·784
1·0	V	1·19	1·45	1·63	1·77	1·87	1·95	2·02
	Q	1·19	2·18	3·26	4·36	5·61	6·84	8·10
	C	0·654	0·701	0·730	0·749	0·764	0·775	0·784
0·8	V	1·06	1·29	1·45	1·57	1·67	1·74	1·81
	Q	1·06	1·94	2·91	3·94	5·01	6·10	7·22
	C	0·652	0·699	0·727	0·747	0·762	0·773	0·782
0·6	V	0·91	1·11	1·25	1·36	1·44	1·50	1·56
	Q	0·91	1·67	2·50	3·39	4·31	5·26	6·22
	C	0·647	0·694	0·723	0·743	0·758	0·769	0·778
0·5	V	0·83	1·02	1·14	1·23	1·31	1·37	1·42
	Q	0·83	1·53	2·28	3·06	3·92	4·78	5·66
	C	0·644	0·691	0·720	0·740	0·755	0·766	0·775
0·4	V	0·74	0·90	1·01	1·10	1·16	1·22	1·26
	Q	0·74	1·35	2·02	2·74	3·48	4·25	5·04
	C	0·638	0·686	0·715	0·735	0·750	0·762	0·771
0·2	V	0·50	0·61	0·69	0·75	0·80	0·84	0·87
	Q	0·50	0·92	1·39	1·88	2·40	2·93	3·47
	C	0·615	0·664	0·693	0·714	0·730	0·742	0·751
0·1	V	0·33	0·41	0·47	0·51	0·54	0·57	0·59
	Q	0·33	0·62	0·93	1·27	1·62	1·98	2·34
	C	0·578	0·627	0·658	0·680	0·696	0·709	0·718

V and Q are always in feet

TABLE VIII.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

Section, in new Rubble, or in old Brickwork or Ashlar.

For a Bed-width of 3 feet.

N=0·017.

S per thousand.		Depths of water in feet. 0·5	0·75	1·	1·5	2·	2·5	3
5·0	V	2·93	3·65	4·18	4·94	5·44	5·80	6·08
	Q	4·39	8·11	12·55	22·21	32·64	43·53	54·73
	C	0·676	0·730	0·764	0·806	0·831	0·848	0·860
3·0	V	2·27	2·83	3·24	3·62	4·21	4·50	5·01
	Q	3·40	6·36	9·72	16·30	25·28	33·72	45·08
	C	0·676	0·730	0·764	0·806	0·831	0·848	0·860
2·0	V	1·85	2·31	2·75	3·12	3·44	3·69	3·85
	Q	2·78	5·20	8·24	14·05	20·64	27·69	34·61
	C	0·676	0·730	0·764	0·806	0·831	0·848	0·860
1·0	V	1·31	1·63	1·87	2·21	2·43	2·60	2·72
	Q	1·96	3·67	5·61	9·93	14·60	19·47	24·47
	C	0·676	0·730	0·764	0·806	0·831	0·848	0·860
0·8	V	1·17	1·45	1·67	1·97	2·17	2·32	2·43
	Q	1·75	3·27	5·01	8·86	13·03	17·37	21·83
	C	0·673	0·727	0·762	0·804	0·829	0·846	0·858
0·6	V	1·00	1·25	1·44	1·70	1·87	2·00	2·09
	Q	1·51	2·81	4·31	7·64	11·23	14·99	18·85
	C	0·669	0·723	0·758	0·800	0·826	0·843	0·855
0·5	V	0·91	1·14	1·31	1·54	1·70	1·82	1·91
	Q	1·37	2·56	3·92	6·95	10·23	13·63	17·17
	C	0·665	0·720	0·755	0·798	0·823	0·840	0·853
0·4	V	0·81	1·01	1·16	1·38	1·52	1·62	1·70
	Q	1·21	2·27	3·48	6·19	9·10	12·15	15·28
	C	0·660	0·715	0·750	0·794	0·819	0·837	0·849
0·2	V	0·55	0·69	0·80	0·95	1·05	1·12	1·18
	Q	0·83	1·56	2·40	4·27	6·30	8·42	10·60
	C	0·637	0·693	0·730	0·775	0·802	0·820	0·833
0·1	V	0·37	0·47	0·54	0·64	0·72	0·77	0·81
	Q	0·55	1·05	1·62	2·90	4·29	5·75	7·25
	C	0·601	0·658	0·696	0·744	0·773	0·792	0·806

and cubic feet per second.

TABLE VIII.

Mean Velocities (V) of Discharge, Quantities dis-

For Canals, Channels, and Acqueducts of Rectangular

For a Bed-width of 4 feet.

N=0·017.

S per thousand.		Depths of water in feet. 1	1·5	2	2·5	3·0	3·5	4
5·0	V	4·53	5·44	6·08	6·55	6·92	7·21	7·45
	Q	18·10	32·64	48·64	65·51	82·00	100·93	119·14
	C	0·784	0·831	0·860	0·879	0·893	0·904	0·912
3·0	V	3·51	4·21	5·01	5·07	5·36	5·59	5·77
	Q	14·02	25·28	40·08	50·74	64·30	78·22	92·27
	C	0·784	0·831	0·860	0·879	0·893	0·904	0·912
2·0	V	2·86	3·44	3·85	4·14	4·37	4·56	4·71
	Q	11·45	20·64	30·80	41·44	52·49	63·87	75·33
	C	0·784	0·831	0·860	0·879	0·893	0·904	0·912
1·0	V	2·02	2·43	2·72	2·93	3·09	3·23	3·33
	Q	8·10	14·60	20·36	29·30	37·12	45·15	53·28
	C	0·784	0·831	0·860	0·879	0·893	0·904	0·912
0·8	V	1·81	2·17	2·43	2·61	2·76	2·88	2·98
	Q	7·22	13·03	19·44	26·14	33·18	40·33	47·60
	C	0·782	0·829	0·858	0·877	0·892	0·903	0·911
0·6	V	1·56	1·87	2·09	2·26	2·39	2·49	2·57
	Q	6·22	11·23	16·72	22·59	28·62	34·83	41·09
	C	0·778	0·826	0·855	0·875	0·889	0·900	0·908
0·5	V	1·42	1·70	1·91	2·06	2·17	2·27	2·34
	Q	5·66	10·23	15·28	20·58	26·06	31·71	37·42
	C	0·775	0·823	0·853	0·873	0·887	0·898	0·906
0·4	V	1·26	1·52	1·70	1·83	1·94	2·02	2·09
	Q	5·04	9·10	13·58	18·32	23·24	28·27	33·36
	C	0·771	0·819	0·849	0·869	0·884	0·895	0·903
0·2	V	0·87	1·05	1·18	1·27	1·35	1·41	1·46
	Q	3·47	6·30	9·44	12·72	16·18	19·70	23·28
	C	0·751	0·802	0·833	0·854	0·870	0·882	0·891
0·1	V	0·59	0·72	0·81	0·87	0·93	0·97	1·01
	Q	2·34	4·29	6·45	8·74	11·11	13·58	16·08
	C	0·718	0·773	0·806	0·829	0·846	0·860	0·870

V and Q are always in feet

TABLE VIII.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

Section, in new Rubble, or in old Brickwork, or Ashlar.

For a Bed-width of 5 feet.

N=0·017.

S per thousand.		Depths of water in feet. 1·	2·	2·5	3·	3·5	4·	5·
5·0	V	4·74	6·55	7·12	7·57	7·85	8·23	8·69
	Q	23·72	65·51	89·05	113·5	137·4	164·5	217·5
	C	0·794	0·879	0·901	0·917	0·926	0·938	0·952
3·0	V	3·67	5·07	6·57	5·87	6·08	6·37	6·73
	Q	18·37	50·74	82·10	87·99	106·4	127·4	168·3
	C	0·794	0·879	0·901	0·917	0·926	0·938	0·952
2·0	V	3·00	4·14	4·51	4·79	4·97	5·20	5·50
	Q	15·00	41·44	56·63	71·85	86·91	104·0	137·4
	C	0·794	0·879	0·901	0·917	0·926	0·938	0·952
1·0	V	2·12	2·93	3·19	3·39	3·51	3·68	3·89
	Q	10·61	29·30	39·82	50·79	61·47	73·58	97·15
	C	0·794	0·879	0·901	0·917	0·926	0·938	0·952
0·8	V	1·89	2·61	2·84	3·03	3·14	3·29	3·48
	Q	9·47	26·14	35·53	47·39	54·94	65·72	86·92
	C	0·792	0·877	0·899	0·916	0·925	0·937	0·951
0·6	V	1·63	2·26	2·46	2·62	2·72	2·82	3·00
	Q	9·16	22·59	30·71	39·22	47·60	56·38	75·02
	C	0·788	0·875	0·897	0·914	0·923	0·935	0·949
0·5	V	1·48	2·06	2·24	2·38	2·47	2·59	2·73
	Q	7·42	20·58	27·97	35·73	43·22	51·74	63·32
	C	0·785	0·873	0·895	0·912	0·921	0·933	0·947
0·4	V	1·32	1·83	1·99	2·12	2·20	2·31	2·44
	Q	6·60	18·32	24·92	31·85	38·57	46·18	61·07
	C	0·781	0·869	0·892	0·909	0·919	0·931	0·946
0·2	V	0·91	1·28	1·39	1·48	1·54	1·62	1·71
	Q	4·55	12·75	17·35	22·88	26·91	32·30	42·72
	C	0·762	0·854	0·878	0·896	0·907	0·921	0·936
0·1	V	0·63	0·87	0·96	1·02	1·06	1·12	1·19
	Q	3·16	8·74	11·95	15·31	18·58	22·34	29·65
	C	0·730	0·829	0·855	0·874	0·886	0·901	0·919

and cubic feet per second.

TABLE VIII.

MEAN VELOCITIES (V), OF DISCHARGE, QUANTITIES DIS-

For Canals, Channels, and Aqueducts of Rectangular

For a Bed-width of 6 feet.

N=0·017.

S per thousand.		Depths of water in feet.						
		1.	2·	2·5	3·0	3·5	4·	5·
5·0	V	4·94	6·92	7·57	8·08	8·50	8·86	9·42
	Q	29·64	83·00	113·5	145·4	178·5	212·6	282·6
	C	0·806	0·893	0·917	0·933	0·946	0·957	0·973
3·0	V	3·62	5·36	5·87	6·26	6·59	6·86	7·30
	Q	21·72	64·31	87·99	112·7	138·3	164·7	218·9
	C	0·806	0·893	0·917	0·933	0·946	0·957	0·973
2·0	V	3·12	4·37	4·79	5·11	5·38	5·60	5·96
	Q	18·72	51·19	71·85	91·98	112·9	134·5	178·7
	C	0·806	0·893	0·917	0·933	0·946	0·957	0·973
1·0	V	2·21	3·09	3·39	3·61	3·80	3·96	4·21
	Q	13·26	37·12	50·79	65·05	79·84	95·09	126·4
	C	0·806	0·893	0·917	0·933	0·946	0·957	0·973
0·8	V	1·97	2·76	3·03	3·23	3·40	3·54	3·77
	Q	11·82	33·16	45·39	58·12	71·32	84·96	113·0
	C	0·804	0·892	0·916	0·932	0·945	0·956	0·972
0·6	V	1·70	2·39	2·62	2·79	2·94	3·06	3·25
	Q	10·20	28·62	39·22	50·22	61·66	73·44	97·59
	C	0·800	0·889	0·914	0·930	0·943	0·954	0·970
0·5	V	1·54	2·17	2·38	2·54	2·68	2·79	2·97
	Q	9·24	26·06	35·73	45·76	56·22	66·96	89·01
	C	0·798	0·887	0·912	0·928	0·942	0·953	0·969
0·4	V	1·38	1·94	2·12	2·27	2·39	2·49	2·65
	Q	8·28	23·24	31·85	40·82	50·19	59·76	79·44
	C	0·794	0·884	0·909	0·926	0·940	0·951	0·967
0·2	V	0·05	1·35	1·48	1·59	1·67	1·74	1·86
	Q	5·70	16·18	22·88	28·53	35·05	41·81	55·74
	C	0·775	0·870	0·896	0·915	0·929	0·941	0·959
0·1	V	0·64	0·93	1·02	1·10	1·16	1·21	1·29
	Q	3·84	11·12	15·31	19·73	24·34	29·06	38·76
	C	0·744	0·846	0·874	0·895	0·912	0·925	0·944

V and Q are always in feet

TABLE VIII.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

Section, in new Rubble, or in old Brickwork or Ashlar.

For a Bed-width of 8 feet.

N=0·017.

S per thousand.		Depths of water in feet. 1·	2·	2·5	·3	3·5	4·	5·
5·0	V	5·17	7·45	8·23	8·86	9·39	9·84	10·6
	Q	41·39	119·1	164·5	200·6	262·9	314·9	422·0
	C	0·818	0·912	0·938	0·957	0·972	0·984	1·001
3·0	V	4·01	5·77	6·37	6·86	7·27	7·62	8·17
	Q	32·06	92·27	127·5	164·7	203·6	243·9	326·9
	C	0·818	0·912	0·938	0·957	0·972	0·984	1·001
2·0	V	3·27	4·71	5·20	5·70	5·94	6·22	6·67
	Q	26·18	75·34	104·0	136·9	166·3	199·2	266·9
	C	0·818	0·912	0·938	0·957	0·972	0·984	1·001
1·0	V	2·31	3·33	3·68	3·96	4·20	4·40	4·72
	Q	18·50	53·28	73·56	95·09	117·6	140·8	188·7
	C	0·818	0·912	0·938	0·957	0·972	0·984	1·001
0·8	V	2·06	2·98	3·29	3·54	3·75	3·932	4·22
	Q	16·51	48·50	65·72	84·96	105·1	125·8	168·8
	C	0·816	0·911	0·937	0·956	0·971	0·983	1·001
0·6	V	1·78	2·77	2·82	3·06	3·24	3·40	3·65
	Q	14·25	44·29	56·38	73·42	90·78	108·9	146·0
	C	0·813	0·908	0·935	0·954	0·969	0·982	1·000
0·5	V	1·62	2·34	2·59	2·79	2·96	3·10	3·33
	Q	12·96	37·42	51·74	66·96	82·80	99·17	133·2
	C	0·810	0·906	0·933	0·953	0·968	0·980	0·999
0·4	V	1·44	2·09	2·31	2·49	2·64	2·77	2·98
	Q	11·54	33·36	46·18	59·76	73·89	88·61	119·0
	C	0·806	0·903	0·931	0·951	0·966	0·979	0·998
0·2	V	1·00	1·46	1·62	1·74	1·85	1·94	2·09
	Q	7·97	23·28	32·30	41·81	51·83	62·11	83·64
	C	0·788	0·891	0·921	0·941	0·958	0·971	0·992
0·1	V	0·68	1·00	1·12	1·21	1·29	1·36	1·46
	Q	5·41	16·08	22·34	27·06	36·06	43·39	58·52
	C	0·758	0·870	0·901	0·925	0·943	0·959	0·982

and cubic feet per second.

TABLE VIII.

Mean Velocities (V) of Discharge, Quantities dis-

For Canals, Channels, and Aqueducts of Rectangular

For a Bed-width of 10 feet.

N=0·017.

S per thousand.		Depths of water in feet. 1·0	2·0	3·0	3·5	4·0	4·5	5·
2·0	V	3·372	4·945	5·959	6·345	6·672	6·963	7·219
	Q	33·72	98·90	178·8	222·1	266·9	313·3	361·0
	C	0·826	0·925	0·973	0·989	1·001	1·012	1·021
1·5	V	2·921	4·282	5·160	5·495	5·778	6·029	6·252
	Q	29·21	85·64	154·8	192·3	231·1	271·3	312·6
	C	0·826	0·925	0·973	0·989	1·001	1·012	1·021
1·0	V	2·384	3·497	4·213	4·487	4·718	4·923	5·105
	Q	23·84	69·94	126·4	152·0	188·7	221·5	255·3
	C	0·826	0·925	0·973	0·989	1·001	1·012	1·021
0·8	V	2·125	3·121	3·765	4·009	4·219	4·404	4·566
	Q	21·25	62·42	113·0	140·3	168·8	198·2	228·3
	C	0·823	0·923	0·972	0·988	1·001	1·012	1·021
0·6	V	1·832	2·697	3·253	3·468	3·651	3·809	3·950
	Q	18·32	53·94	97·59	121·4	146·0	171·4	197·5
	C	0·820	0·921	0·970	0·987	1·000	1·011	1·020
0·4	V	1·486	2·193	2·648	2·823	2·975	3·105	3·222
	Q	14·86	43·86	79·44	98·81	119·0	139·7	161·1
	C	0·814	0·917	0·967	0·984	0·998	1·009	1·019
0·3	V	1·276	1·891	2·286	2·438	2·572	2·686	2·786
	Q	12·76	37·82	68·58	85·33	102·9	120·9	139·3
	C	0·807	0·913	0·964	0·981	0·996	1·008	1·017
0·2	V	1·028	1·529	1·858	1·980	2·091	2·187	2·267
	Q	10·28	30·58	55·74	69·30	83·64	98·42	113·4
	C	0·796	0·905	0·959	0·976	0·992	1·005	1·014
0·1	V	0·699	1·056	1·295	1·385	1·463	1·532	1·592
	Q	6·99	21·12	38·85	48·48	58·52	68·94	79·60
	C	0·766	0·884	0·944	0·965	0·982	0·996	1·007
0·05	V	0·467	0·722	0·894	0·959	1·019	1·068	1·114
	Q	4·67	14·43	26·83	33·57	40·77	48·06	55·68
	C	0·724	0·854	0·923	0·946	0·967	0·982	0·996

V and Q are always in feet

TABLE VIII.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

Section, in new Rubble, or in old Brickwork, or Ashlar.

For a Bed-width of 12 feet.

N=0·017.

S per thousand.		Depths of water in feet. 1·0	2·0	3·0	3·5	4·0	4·5	5·0
2·0	V	3·440	5·110	6·224	6·653	7·025	7·356	7·644
	Q	41·28	122·6	224·1	279·4	337·2		
	C	0·831	0·933	0·984	1·001	1·014	1·026	1·035
1·5	V	2·979	4·425	5·388	5·762	6·084	6·371	6·619
	Q	357·4	106·2	193·9	242·0	292·0		
	C	0·831	0·933	0·984	1·001	1·014	1·026	1·035
1·0	V	2·434	3·614	4·400	4·705	4·967	5·203	5·405
	Q	29·21	86·74	105·6	197·6	238·4		
	C	0·831	0·933	0·984	1·001	1·014	1·026	1·035
0·8	V	2·177	3·228	3·932	4·204	4·443	4·648	4·834
	Q	26·12	77·47	141·6	176·6	213·3		
	C	0·829	0·932	0·983	1·000	1·014	1·025	1·035
0·6	V	1·873	2·790	3·402	3·637	3·844	4·030	4·187
	Q	22·48	66·96	122·5	152·8	184·5		
	C	0·826	0·930	0·982	0·999	1·013	1·024	1·035
0·4	V	1·517	2·268	2·769	2·963	3·132	3·281	3·415
	Q	18·20	54·43	99·68	124·5	150·3		
	C	0·819	0·926	0·979	0·997	1·011	1·023	1·034
0·3	V	1·303	1·956	2·390	2·561	2·709	2·838	2·954
	Q	15·64	46·94	86·04	107·6	130·0		
	C	0·813	0·922	0·976	0·995	1·010	1·022	1·033
0·2	V	1·051	1·585	1·942	2·083	2·206	2·311	2·408
	Q	12·61	38·04	69·91	87·49	105·9		
	C	0·802	0·915	0·971	0·991	1·007	1·019	1·031
0·1	V	0·716	1·096	1·356	1·456	1·546	1·624	1·695
	Q	8·59	26·30	48·82	61·15	74·21		
	C	0·773	0·895	0·959	0·980	0·998	1·013	1·026
0·05	V	0·478	0·751	0·939	1·013	1·079	1·137	1·189
	Q	4·54	18·01	33·86	42·55	51·79	61·40	
	C	0·730	0·867	0·939	0·964	0·985	1·003	1·018

and cubic feet per second.

TABLE VIII.

MEAN VELOCITIES (V) OF DISCHARGE, QUANTITIES DIS-

For Canals, Channels, and Aqueducts of Rectangular

For a Bed-width of 14 feet.

N=0·017.

S per thousand.		Depths of water in feet. 1	2	3	4	5	6	7
2·0	V	3·494	5·243	6·429	7·305	7·989	8·535	8·995
	Q	48·92	146·8	270·0	409·1	559·2	716·9	881·6
	C	0·835	0·940	0·992	1·024	1·046	1·062	1·075
1·5	V	3·025	4·540	5·567	6·326	6·918	7·393	7·789
	Q	42·35	127·1	233·8	354·3	484·3	621·0	763·0
	C	0·835	0·940	0·992	1·024	1·046	1·062	1·075
1·0	V	2·470	3·706	4·546	5·166	5·649	6·035	6·360
	Q	34·58	103·8	190·9	289·3	395·4	506·7	623·3
	C	0·835	0·940	0·992	1·024	1·046	1·062	1·075
0·8	V	2·204	3·313	4·062	4·620	5·053	5·398	5·689
	Q	30·86	92·76	170·6	258·7	353·7	453·4	557·5
	C	0·833	0·939	0·991	1·024	1·046	1·062	1·075
0·6	V	1·902	2·863	3·515	3·998	4·375	4·675	4·927
	Q	26·63	80·16	147·6	223·9	304·2	392·7	482·9
	C	0·830	0·937	0·990	1·023	1·046	1·062	1·075
0·4	V	1·540	2·327	2·863	3·261	3·570	3·817	4·026
	Q	21·56	65·16	120·2	182·6	249·9	320·6	394·6
	C	0·823	0·933	0·988	1·022	1·045	1·062	1·076
0·3	V	1·324	2·008	2·472	2·818	3·088	3·306	3·486
	Q	18·54	56·22	103·8	157·8	216·2	277·7	341·6
	C	0·817	0·929	0·985	1·020	1·044	1·062	1·076
0·2	V	1·066	1·626	2·010	2·297	2·519	2·700	2·850
	Q	14·92	45·53	84·42	128·6	176·3	226·8	279·3
	C	0·806	0·922	0·981	1·018	1·043	1·062	1·077
0·1	V	0·727	1·126	1·404	1·613	1·875	1·908	2·019
	Q	10·18	31·53	58·97	90·33	131·3	160·3	197·9
	C	0·777	0·903	0·969	1·011	1·040	1·062	1·079
0·05	V	0·487	0·772	0·975	1·129	1·249	1·349	1·431
	Q	6·828	22·02	40·95	63·22	87·43	131·3	140·2
	C	0·735	0·875	0·951	1·001	1·035	1·061	1·082

V and Q are always in feet

TABLE VIII.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

Section, in new Rubble, or in old Brickwork, or Ashlar.

For a Bed-width of 16 feet.

N=0·017.

S per thousand.		Depths of water in feet. 1	2	3	4	5	6	7
2·0	V	3·532	5·345	6·600	7·537	8·281	8·877	9·358
	Q	56·51	171·0	316·8	482·4	662·5	852·2	1048·
	C	0·838	0·945	0·999	1·032	1·055	1·072	1·083
1·5	V	3·060	4·630	5·715	6·526	7·171	7·687	8·113
	Q	48·96	148·2	274·3	417·7	572·7	738·0	908·7
	C	0·838	0·945	0·999	1·032	1·055	1·072	1·083
1·0	V	2·497	3·780	4·666	5·328	5·855	6·278	6·617
	Q	39·95	121·0	224·0	341·0	468·4	602·4	741·1
	C	0·838	0·945	0·999	1·032	1·055	1·072	1·083
0·8	V	2·231	3·378	4·170	4·761	5·237	5·614	5·918
	Q	35·70	108·1	200·2	304·7	419·0	529·9	662·8
	C	0·836	0·944	0·998	1·031	1·055	1·072	1·083
0·6	V	1·923	2·918	3·607	4·124	4·535	4·863	5·126
	Q	30·77	93·38	173·1	263·9	362·8	466·8	574·1
	C	0·833	0·942	0·997	1·031	1·055	1·072	1·083
0·4	V	1·556	2·373	2·939	3·361	3·700	3·971	4·189
	Q	24·90	75·94	141·1	215·1	296·0	381·3	469·2
	C	0·826	0·938	0·995	1·029	1·054	1·072	1·084
0·3	V	1·339	2·046	2·538	2·907	3·204	3·438	3·630
	Q	21·42	65·47	121·8	186·0	256·3	330·0	406·6
	C	0·820	0·934	0·992	1·028	1·054	1·072	1·085
0·2	V	1·078	1·660	2·064	2·369	2·614	2·809	2·970
	Q	17·25	53·12	99·07	151·6	209·1	269·7	332·6
	C	0·809	0·928	0·988	1·026	1·053	1·073	1·087
0·1	V	0·735	1·151	1·443	1·667	1·846	1·989	2·104
	Q	11·76	36·83	69·32	106·7	147·7	180·9	235·6
	C	0·780	0·910	0·977	1·021	1·052	1·074	1·089
0·05	V	0·492	0·789	1·003	1·168	1·302	1·408	1·494
	Q	7·87	25·25	48·14	74·75	104·2	135·2	167·3
	C	0·739	0·883	0·961	1·012	1·049	1·076	1·094

and cubic feet per second.

TABLE VIII.

MEAN VELOCITIES, OF DISCHARGE (V), QUANTITIES DIS-

For Canals, Channels, and Aqueducts of Rectangular

For a Bed-width of 18 feet.

N=0·017.

S per thousand.		Depths of water in feet. 1	2	3	4	5	6	7
2·0	V	3·564	5·428	6·735	7·723	8·514	9·155	9·700
	Q	64·15	195·4	363·7	556·1	766·3	988·7	1222·
	C	0·840	0·949	1·004	1·038	1·062	1·079	1·093
1·5	V	3·086	4·701	5·832	6·689	7·373	7·928	8·412
	Q	55·55	169·2	316·9	481·6	663·6	856·2	1060·
	C	0·840	0·949	1·004	1·038	1·062	1·079	1·093
1·0	V	2·520	3·839	4·762	5·461	6·020	6·474	6·859
	Q	45·36	156·4	257·1	393·2	541·8	699·2	864·2
	C	0·840	0·949	1·004	1·038	1·062	1·079	1·093
0·8	V	2·248	3·429	4·254	4·885	5·385	5·791	6·135
	Q	40·47	123·9	229·7	327·7	484·7	625·4	773·0
	C	0·838	0·948	1·003	1·038	1·062	1·079	1·093
0·6	V	1·941	2·964	3·681	4·226	4·663	5·015	5·324
	Q	34·93	106·7	198·8	304·3	419·7	541·6	670·8
	C	0·835	0·946	1·002	1·037	1·062	1·079	1·094
0·4	V	1·573	2·410	3·000	3·447	3·807	4·099	4·335
	Q	28·13	86·76	162·0	248·2	342·6	442·7	546·2
	C	0·829	0·942	1·000	1·036	1·062	1·080	1·095
0·3	V	1·352	2·078	2·593	2·986	3·298	3·552	3·767
	Q	24·34	74·81	140·0	236·6	296·8	383·6	474·6
	C	0·823	0·938	0·998	1·036	1·062	1·081	1·096
0·2	V	1·090	1·686	2·108	2·433	2·692	2·908	3·082
	Q	19·61	60·70	113·8	175·2	257·6	314·1	388·3
	C	0·812	0·932	0·994	1·034	1·062	1·083	1·098
0·1	V	0·743	1·170	1·476	1·712	1·902	2·059	2·189
	Q	13·38	42·12	79·70	123·3	171·2	222·4	275·8
	C	0·783	0·915	0·984	1·029	1·061	1·085	1·103
0·05	V	0·498	0·804	1·027	1·203	1·344	1·461	1·560
	Q	8·96	28·94	55·46	86·62	121·0	157·8	196·6
	C	0·742	0·888	0·969	1·022	1·060	1·089	1·112

V and Q are always in feet

TABLE VIII.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, in new Rubble, or in old Brickwork, or Ashlar.

For a Bed-width of 20 feet.

N=0·017.

S per thousand.		Depths of water in feet. 1	2	3	4	5	6	7
2·0	V	3·590	5·496	6·846	7·907	8·712	9·405	9·980
	Q	71·80	219·8	418·8	632·6	871·2	1129·	1397·
	C	0·842	0·952	1·008	1·046	1·067	1·086	1·100
1·5	V	3·337	4·760	5·928	6·847	7·544	8·145	8·643
	Q	66·74	190·4	237·1	547·8	754·4	977·4	1210·
	C	0·842	0·952	1·008	1·046	1·067	1·086	1·100
1·0	V	2·539	3·886	4·841	5·591	6·160	6·651	7·058
	Q	50·78	155·4	193·6	447·3	616·0	798·1	988·1
	C	0·842	0·952	1·008	1·046	1·067	1·086	1·100
0·8	V	2·265	3·473	4·325	4·996	5·510	5·948	6·312
	Q	45·30	138·9	173·0	399·7	551·0	713·8	883·7
	C	0·840	0·951	1·007	1·045	1·067	1·086	1·100
0·6	V	1·954	3·001	3·742	4·322	4·772	5·151	5·472
	Q	39·08	120·0	149·7	344·9	477·2	618·1	766·1
	C	0·837	0·949	1·006	1·044	1·067	1·086	1·101
0·4	V	1·585	2·443	3·050	3·522	3·899	4·210	4·471
	Q	31·70	97·72	122·0	280·9	389·9	505·2	625·9
	C	0·831	0·946	1·004	1·042	1·068	1·087	1·102
0·3	V	1·362	2·106	2·636	3·047	3·377	3·649	3·876
	Q	27·24	84·24	105·4	243·8	337·7	437·9	542·6
	C	0·825	0·942	1·002	1·041	1·068	1·088	1·103
0·2	V	1·097	1·709	2·146	2·576	2·758	2·984	3·173
	Q	21·94	68·36	128·8	206·1	275·8	358·1	444·2
	C	0·814	0·936	0·999	1·040	1·068	1·090	1·106
0·1	V	0·748	1·186	1·504	1·756	1·949	2·117	2·256
	Q	14·96	47·44	60·16	141·5	194·9	254·0	315·8
	C	0·785	0·919	0·990	1·039	1·068	1·093	1·112
0·05	V	0·465	0·815	1·047	1·236	1·380	1·505	1·612
	Q	9·30	32·60	41·88	98·88	138·0	180·6	225·7
	C	0·745	0·893	0·975	1·034	1·069	1·099	1·123

and cubic feet per second.

TABLE VIII.

Mean Velocities of Discharge (V), Quantities dis-

For Canals, Channels, and Aqueducts of Rectangular

For a Bed-width of 25 feet.

N=0·017.

S per thousand.		Depths of water in feet. 1	2	3	4	5	6	7
1·0	V	3·979	5·005	5·791	6·442	6·981	7·443	7·852
	Q	198·9	375·4	579·1	805·3	1047·	1303·	1570·
	C	0·958	1·017	1·052	1·078	1·097	1·112	1·124
0·8	V	3·555	4·477	5·179	5·762	6·250	6·664	7·029
	Q	177·8	335·8	517·9	720·3	937·5	1166·	1406·
	C	0·957	1·017	1·052	1·078	1·098	1·113	1·125
0·6	V	3·072	3·869	4·486	4·990	5·413	5·776	6·093
	Q	153·6	290·2	448·6	623·7	811·9	1011·	1219·
	C	0·955	1·015	1·052	1·078	1·098	1·114	1·126
0·5	V	2·802	3·529	4·094	4·559	4·946	5·273	5·567
	Q	140·1	264·7	409·4	569·9	741·9	922·7	1113·
	C	0·954	1·014	1·052	1·079	1·099	1·114	1·127
0·4	V	2·498	3·153	3·752	4·078	4·423	4·720	4·988
	Q	124·9	236·5	375·2	509·7	663·5	826·0	997·6
	C	0·952	1·013	1·052	1·079	1·099	1·115	1·129
0·3	V	2·157	2·726	3·169	3·532	3·839	4·095	4·327
	Q	107·9	204·5	316·9	441·5	575·9	716·5	865·4
	C	0·948	1·011	1·051	1·079	1·101	1·117	1·131
0·2	V	1·750	2·217	2·585	2·887	3·139	3·353	3·546
	Q	137·5	166·3	258·5	360·9	470·9	586·7	709·2
	C	0·942	1·008	1·050	1·080	1·103	1·120	1·135
0·15	V	1·508	1·916	2·236	2·503	2·724	2·915	3·083
	Q	75·40	143·7	223·6	312·9	408·6	510·0	616·6
	C	0·937	1·005	1·049	1·081	1·105	1·124	1·139
0·10	V	1·217	1·557	1·825	2·047	2·232	2·390	2·534
	Q	60·85	116·8	182·5	255·9	334·8	418·2	506·8
	C	0·926	1·000	1·048	1·083	1·109	1·129	1·147
0·05	V	0·837	1·007	1·286	1·452	1·592	1·713	1·821
	Q	41·85	75·52	128·6	181·5	238·8	299·7	364·2
	C	0·901	0·988	1·045	1·086	1·119	1·144	1·166

V and Q are always in feet

TABLE VIII.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, in new Rubble, or in old Brickwork, or Ashlar.

For a Bed-width of 30 feet.

N=0·017.

S per thousand.		Depths of water in feet. 2	3	4	5	6	7	8
1·0	V	4·040	5·105	5·949	6·651	7·241	7·745	8·193
	Q	242·4	459·5	713·9	997·6	1303·	1626·	1966·
	C	0·962	1·021	1·059	1·086	1·106	1·121	1·134
0·8	V	3·610	4·566	5·321	5·948	6·477	6·933	7·334
	Q	216·6	410·9	638·5	892·2	1166·	1456·	1760·
	C	0·961	1·021	1·059	1·086	1·106	1·122	1·135
0·6	V	3·120	3·950	4·604	5·151	5·614	6·010	6·357
	Q	187·2	356·5	552·5	772·6	1011·	1262·	1526·
	C	0·959	1·020	1·058	1·086	1·107	1·123	1·136
0·5	V	2·845	3·607	4·202	4·702	5·124	5·491	5·809
	Q	164·7	324·6	504·1	705·3	922·3	1153·	1394·
	C	0·958	1·020	1·058	1·086	1·107	1·124	1·137
0·4	V	2·539	3·222	3·759	4·210	4·588	4·915	5·204
	Q	152·3	280·0	451·1	631·5	825·8	1032·	1249·
	C	0·956	1·019	1·058	1·087	1·108	1·125	1·139
0·3	V	2·192	2·786	3·255	3·649	3·980	4·265	4·515
	Q	131·5	250·7	390·6	547·3	716·4	895·7	1084·
	C	0·953	1·017	1·058	1·088	1·110	1·127	1·141
0·2	V	1·778	2·267	2·659	2·984	3·259	3·495	3·703
	Q	106·4	204·0	319·1	447·6	586·6	734·0	888·7
	C	0·947	1·014	1·058	1·090	1·113	1·131	1·146
0·15	V	1·531	1·959	2·300	2·587	2·830	3·037	3·220
	Q	81·86	176·3	276·0	388·0	509·4	637·8	772·8
	C	0·941	1·012	1·057	1·091	1·116	1·135	1·151
0·10	V	1·236	1·592	1·878	2·117	2·320	2·495	2·651
	Q	74·16	143·3	205·4	317·5	417·6	524·0	636·2
	C	0·931	1·007	1·057	1·093	1·120	1·142	1·160
0·05	V	0·852	1·114	1·326	1·505	1·659	1·792	1·909
	Q	51·12	100·3	159·1	225·8	298·6	376·3	458·2
	C	0·907	0·996	1·055	1·099	1·133	1·160	1·182

and cubic feet per second.

TABLE VIII.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals, Channels, and Aqueducts of Rectangular

For a Bed-width of 35 feet.

N=0·017.

S per thousand.		Depths of water in feet. 2	3	4	5	6	7	8
1·0	V	4·085	5·189	5·955	6·864	7·437	7·976	8·455
	Q	286·0	544·8	833·7	1201·	1562·	1954·	2367·
	C	0·965	1·025	1·059	1·093	1·112	1·128	1·141
0·8	V	3·650	4·640	5·326	6·139	6·658	7·141	7·569
	Q	255·5	487·2	745·6	1074·	1398·	1750·	2119·
	C	0·964	1·025	1·059	1·093	1·113	1·129	1·142
0·6	V	3·154	4·014	4·613	5·322	5·772	6·189	6·567
	Q	220·8	421·5	645·8	931·3	1212·	1516·	1839·
	C	0·962	1·024	1·059	1·094	1·114	1·130	1·144
0·5	V	2·876	3·665	4·211	4·893	5·268	5·655	6·000
	Q	201·3	384·8	589·5	856·2	1106·	1385·	1680·
	C	0·961	1·024	1·059	1·095	1·114	1·131	1·145
0·4	V	2·567	3·275	3·767	4·349	4·716	5·062	5·370
	Q	179·7	343·9	527·4	761·0	990·4	1240·	1504·
	C	0·959	1·023	1·059	1·095	1·115	1·132	1·146
0·3	V	2·216	2·831	3·259	3·769	4·092	4·396	4·664
	Q	155·1	297·3	456·3	659·5	859·3	1077·	1306·
	C	0·956	1·021	1·058	1·096	1·117	1·135	1·149
0·2	V	1·798	2·307	2·661	3·084	3·350	3·602	3·828
	Q	125·9	242·2	372·5	539·7	703·5	882·5	1072·
	C	0·950	1·019	1·058	1·098	1·120	1·139	1·155
0·15	V	1·550	1·991	2·302	2·676	2·912	3·133	3·329
	Q	108·5	209·1	322·3	468·3	611·5	767·6	932·1
	C	0·945	1·016	1·057	1·100	1·124	1·144	1·160
0·10	V	1·252	1·620	1·880	2·191	2·388	2·576	2·741
	Q	87·64	170·1	263·2	383·3	501·5	631·1	767·5
	C	0·935	1·012	1·057	1·103	1·129	1·152	1·170
0·05	V	0·863	1·134	1·328	1·565	1·711	1·853	1·980
	Q	60·41	119·1	185·9	273·9	359·3	454·0	554·4
	C	0·911	1·002	1·056	1·114	1·144	1·172	1·195

V and Q are always in feet

TABLE VIII.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

ection, in new Rubble, or in old Brickwork, or Ashlar.

For a Bed-width of 40 feet.

N=0·017.

S per thousand.		Depths of water in feet. 2	3	4	5	6	7	8
1·0	V	4·123	5·252	6·160	6·926	7·581	8·154	8·670
	Q	329·8	630·2	985·6	1385·	1819·	2283·	2774·
	C	0·967	1·028	1·067	1·095	1·116	1·133	1·147
0·8	V	3·684	4·697	5·510	6·200	6·786	7·300	7·762
	Q	294·7	563·6	881·6	1240·	1629·	2044·	2484·
	C	0·966	1·028	1·067	1·096	1·117	1·134	1·148
0·6	V	3·184	4·064	4·772	5·369	5·882	6·328	6·727
	Q	253·1	487·5	763·5	1074·	1412·	1772·	2152·
	C	0·964	1·027	1·067	1·096	1·118	1·135	1·149
0·5	V	2·903	3·710	4·355	4·906	5·375	5·781	6·147
	Q	232·2	445·2	776·8	981·2	1290·	1619·	1967·
	C	0·963	1·027	1·067	1·097	1·119	1·136	1·150
0·4	V	2·594	3·315	3·899	4·388	4·811	5·180	5·512
	Q	207·5	397·8	623·8	877·6	1155·	1450·	1764·
	C	0·962	1·026	1·068	1·097	1·120	1·138	1·153
0·3	V	2·239	2·868	3·377	3·807	4·173	4·494	4·786
	Q	179·1	344·2	540·3	761·4	1002·	1258·	1532·
	C	0·959	1·025	1·068	1·099	1·122	1·140	1·156
0·2	V	1·817	2·335	2·758	3·114	3·418	3·686	3·929
	Q	145·4	280·2	441·3	622·8	820·3	1032·	1257·
	C	0·953	1·022	1·068	1·101	1·125	1·145	1·162
0·15	V	1·566	2·019	2·388	2·701	2·970	3·206	3·420
	Q	125·3	242·3	382·1	540·2	712·8	897·7	1094·
	C	0·948	1·020	1·068	1·103	1·129	1·150	1·168
0·10	V	1·264	1·642	1·949	2·212	2·440	2·638	2·815
	Q	101·1	197·0	311·8	442·4	585·6	738·6	900·8
	C	0·938	1·016	1·068	1·106	1·136	1·159	1·178
0·05	V	0·873	1·150	1·380	1·577	1·750	1·900	2·036
	Q	69·84	138·0	220·8	315·4	420·0	532·0	651·5
	C	0·915	1·006	1·069	1·115	1·152	1·180	1·205

and cubic feet per second.

TABLE VIII.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals, Channels, and Aqueducts of Rectangular

For a Bed-

N=0·017.

S per thousand.		Depths of water in feet. 2·	2·5	3·	3·5	4·	4·5	5·
0·8	V	3·734	4·285	4·777	5·229	5·635	6·013	6·363
	Q	373·4	535·6	716·5	915·0	1127·	1353·	
	C	0·970	1·005	1·032	1·054	1·073	1·088	1·102
0·6	V	3·227	3·707	4·133	4·515	4·881	5·204	5·510
	Q	322·7	463·4	619·9	790·0	976·2	1171·	1377·
	C	0·968	1·004	1·031	1·054	1·073	1·088	1·102
0·5	V	2·943	3·382	3·774	4·130	4·455	4·756	5·035
	Q	294·3	422·7	566·1	722·7	891·0	1069·	1259·
	C	0·967	1·003	1·031	1·054	1·073	1·089	1·103
0·4	V	2·627	3·021	3·371	3·697	3·985	4·260	4·507
	Q	262·7	377·6	505·6	646·9	797·0	958·5	1127·
	C	0·965	1·002	1·030	1·054	1·073	1·090	1·104
0·3	V	2·270	2·611	2·917	3·191	3·451	3·690	3·907
	Q	227·0	326·4	437·5	558·3	690·2	830·2	976·7
	C	0·963	1·000	1·029	1·053	1·073	1·091	1·105
0·25	V	2·055	2·377	2·660	2·929	3·153	3·370	3·570
	Q	205·5	297·1	399·0	512·5	630·6	758·2	892·5
	C	0·955	0·998	1·028	1·053	1·074	1·091	1·106
0·20	V	1·842	2·124	2·378	2·612	2·820	3·018	3·199
	Q	184·2	265·5	356·7	457·1	564·0	679·0	799·7
	C	0·957	0·996	1·027	1·053	1·074	1·092	1·108
0·15	V	1·587	1·834	2·055	2·253	2·443	2·617	2·775
	Q	158·7	229·2	308·2	394·2	488·6	588·8	698·7
	C	0·952	0·993	1·025	1·052	1·074	1·094	1·110
0·10	V	1·282	1·488	1·673	1·843	1·996	2·142	2·276
	Q	128·2	186·0	251·0	322·4	399·2	481·9	569·0
	C	0·942	0·987	1·022	1·051	1·075	1·096	1·115
0·05	V	0·885	1·036	1·173	1·301	1·415	1·524	1·626
	Q	88·5	129·5	175·9	227·6	283·1	342·9	406·5
	C	0·919	0·972	1·013	1·048	1·078	1·103	1·126

V and Q are always in feet

TABLE VIII.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, in new Rubble, or in old Brickwork, or Ashlar.

width of 50 feet.

N=0·017.

S per thousand.		Depths of water in feet. 5·5	6·	6·5	7·	7·5	8·	9·
0·8	V	6·690	6·994	7·277	7·554	7·805	8·049	8·500
	Q	1840·	2098·	2365·	2644·	2927·	3220·	3825·
	C	1·114	1·124	1·133	1·142	1·149	1·156	1·168
0·6	V	5·793	6·064	6·308	6·548	6·764	6·977	7·373
	Q	1593·	1819·	2050·	2292·	2537·	2790·	3317·
	C	1·114	1·125	1·134	1·143	1·150	1·157	1·170
0·5	V	5·294	5·539	5·764	5·983	6·186	6·380	6·737
	Q	1456·	1662·	1873·	2094·	2320·	2552·	3027·
	C	1·115	1·126	1·135	1·144	1·152	1·159	1·171
0·4	V	4·739	4·959	5·164	5·361	5·543	5·716	6·040
	Q	1303·	1488·	1678·	1876·	2079·	2286·	2718·
	C	1·116	1·127	1·137	1·146	1·154	1·161	1·174
0·3	V	4·109	4·308	4·480	4·655	4·812	4·963	5·249
	Q	1130·	1292·	1456·	1629·	1805·	1985·	2362·
	C	1·118	1·130	1·139	1·149	1·157	1·164	1·178
0·25	V	3·756	3·938	4·098	4·258	4·405	4·542	4·804
	Q	1033·	1181·	1332·	1490·	1652·	1817·	2162·
	C	1·119	1·132	1·141	1·151	1·160	1·167	1·181
0·20	V	3·366	3·528	3·675	3·817	3·951	4·077	4·312
	Q	925·6	1058·	1194·	1336·	1482·	1631·	1940·
	C	1·121	1·134	1·144	1·154	1·163	1·171	1·185
0·15	V	2·925	3·067	3·197	3·323	3·438	3·549	3·759
	Q	804·3	920·1	1039·	1080·	1289·	1420·	1691·
	C	1·125	1·138	1·149	1·160	1·169	1·177	1·193
0·10	V	2·401	2·519	2·630	2·734	2·834	2·927	3·103
	Q	660·2	755·7	854·7	888·6	1063·	1171·	1397·
	C	1·131	1·145	1·158	1·169	1·180	1·189	1·206
0·05	V	1·721	1·810	1·893	1·975	2·051	2·122	2·259
	Q	473·2	543·0	615·2	641·9	769·0	896·8	1016·
	C	1·146	1·163	1·179	1·194	1·207	1·219	1·241

and cubic feet per second.

TABLE VIII.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals, Channels, and Aqueducts of Rectangular

For a Bed-

N=0·017.

S per thousand.		Depths of water in feet. 2·	2·5	3·	3·5	4·	4·5	5·
0·8	V	3·765	4·326	4·834	5·292	5·717	6·110	6·446
	Q	451·8	648·9	870·1	1111·	1372·	1650·	1934·
	C	0·972	1·007	1·035	1·057	1·076	1·092	1·106
0·6	V	3·253	3·744	4·187	4·583	4·951	5·292	5·614
	Q	390·4	561·6	753·7	962·4	1188·	1429·	1684·
	C	0·970	1·006	1·035	1·057	1·076	1·092	1·107
0·5	V	2·968	3·417	3·819	4·079	4·524	4·830	5·124
	Q	356·2	512·5	687·4	856·6	1086·	1304·	1537·
	C	0·969	1·006	1·034	1·057	1·077	1·092	1·107
0·4	V	2·649	3·050	3·412	3·743	4·046	4·324	4·566
	Q	317·9	457·5	614·2	786·0	971·0	1168·	1370·
	C	0·967	1·004	1·033	1·057	1·077	1·093	1·108
0·3	V	2·286	2·639	2·952	3·241	3·505	3·748	3·980
	Q	274·3	395·8	531·4	680·6	841·2	1012·	1194·
	C	0·964	1·003	1·032	1·057	1·077	1·094	1·110
0·25	V	2·083	2·406	2·695	2·959	3·199	3·424	3·637
	Q	250·0	360·8	485·1	621·4	767·8	924·5	1091·
	C	0·962	1·001	1·032	1·057	1·077	1·095	1·111
0·2	V	1·858	2·146	2·408	2·647	2·864	3·069	3·243
	Q	223·0	321·9	433·4	555·9	687·4	828·6	972·9
	C	0·959	0·999	1·031	1·057	1·078	1·097	1·113
0·15	V	1·600	1·853	2·084	2·289	2·483	2·663	2·828
	Q	192·0	277·9	375·1	480·7	595·9	719·0	848·4
	C	0·954	0·996	1·030	1·056	1·079	1·099	1·115
0·1	V	1·292	1·504	1·695	1·868	2·029	2·180	2·307
	Q	155·0	225·6	305·1	392·3	487·0	588·6	692·1
	C	0·944	0·990	1·026	1·055	1·080	1·102	1·120
0·05	V	0·893	1·047	1·189	1·318	1·441	1·553	1·651
	Q	107·2	157·1	214·0	276·8	345·8	419·3	495·3
	C	0·922	0·975	1·018	1·053	1·084	1·110	1·133

V and Q are always in feet

TABLE VIII.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, in new Rubble, or in old Brickwork, or Ashlar.

width of 60 feet.

N=0·017.

S per thousand.		Depths of water in feet. 5·5	6·	6·5	7·	7·5	8·	9·
0·8	V	6·816	7·254	7·440	7·728	7·995	8·178	8·737
	Q	2249·	2611·	2902·	3246·	3598·	3926·	4718·
	C	1·118	1·129	1·138	1·147	1·154	1·162	1·174
0·6	V	5·908	6·189	6·449	6·700	6·936	7·159	7·579
	Q	1950·	2228·	2515·	2814·	3121·	3436·	4093·
	C	1·119	1·130	1·139	1·148	1·156	1·163	1·176
0·5	V	3·398	5·655	5·893	6·121	6·342	6·547	6·931
	Q	1781·	2036·	2298·	2571·	2854·	3143·	3743·
	C	1·120	1·131	1·140	1·149	1·158	1·165	1·178
0·4	V	4·833	5·062	5·279	5·485	5·682	5·807	6·214
	Q	1595·	1822·	2059·	2304·	2557·	2787·	3356·
	C	1·121	1·132	1·142	1·151	1·160	1·167	1·181
0·3	V	4·193	4·396	4·581	4·758	4·935	5·097	5·400
	Q	1384·	1583·	1787·	1998·	2221·	2429·	2916·
	C	1·123	1·135	1·144	1·153	1·163	1·171	1·185
0·25	V	3·835	4·020	4·189	4·355	4·516	4·586	4·943
	Q	1266·	1447·	1634·	1829·	2032·	2201·	2669·
	C	1·125	1·137	1·146	1·156	1·166	1·173	1·188
0·2	V	3·436	3·602	3·759	3·908	4·053	4·142	4·439
	Q	1134·	1297·	1466·	1641·	1824·	1988·	2397·
	C	1·127	1·139	1·150	1·160	1·170	1·177	1·193
0·15	V	2·986	3·133	3·270	3·402	3·528	3·647	3·868
	Q	985·4	1128·	1275·	1429·	1588·	1751·	2089·
	C	1·131	1·144	1·155	1·166	1·176	1·185	1·200
0·1	V	2·451	2·576	2·693	2·802	2·907	2·978	3·197
	Q	808·8	927·4	1050·	1177·	1308·	1429·	1726·
	C	1·137	1·152	1·165	1·176	1·187	1·197	1·215
0·05	V	1·728	1·853	1·942	2·028	2·108	2·167	2·330
	Q	570·2	667·1	757·4	851·7	948·6	1040·	1258·
	C	1·153	1·172	1·188	1·203	1·217	1·231	1·252

and cubic feet per second.

TABLE VIII.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals, Channels, and Aqueducts of Rectangular

For a Bed-

N=0·017.

S per thousand.		Depths of water in feet. 2·	2·5	3·	3·5	4·	4·5	5·
0·8	V	3·802	4·385	4·909	5·388	5·831	6·241	6·624
	Q	608·3	877·0	1178·	1509·	1866·	2247·	2650·
	C	0·974	1·011	1·039	1·062	1·081	1·097	1·111
0·6	V	3·286	3·795	4·253	4·665	5·049	5·410	5·742
	Q	525·8	759·0	1021·	1306·	1616·	1948·	2297·
	C	0·972	1·010	1·039	1·062	1·081	1·098	1·112
0·5	V	2·997	3·461	3·878	4·260	4·614	4·939	5·247
	Q	479·5	692·2	930·7	1193·	1476·	1778·	2099·
	C	0·971	1·009	1·038	1·062	1·082	1·098	1·113
0·4	V	2·674	3·092	3·465	3·809	4·126	4·420	4·697
	Q	427·8	618·4	831·6	1067·	1320·	1591·	1879·
	C	0·969	1·008	1·037	1·062	1·082	1·099	1·114
0·3	V	2·310	2·672	2·997	3·299	3·574	3·832	4·075
	Q	369·6	534·4	719·3	923·7	1144·	1380·	1630·
	C	0·966	1·006	1·036	1·062	1·082	1·100	1·116
0·25	V	2·104	2·437	2·737	3·012	3·265	3·501	3·723
	Q	336·6	487·4	656·9	843·4	1045·	1260·	1489·
	C	0·964	1·005	1·036	1·062	1·083	1·101	1·117
0·2	V	1·876	2·175	2·446	2·692	2·924	3·135	3·336
	Q	300·2	435·0	587·0	753·8	935·7	1129·	1334·
	C	0·961	1·003	1·035	1·061	1·084	1·102	1·119
0·15	V	1·617	1·879	2·117	2·331	2·535	2·723	2·897
	Q	258·7	375·8	508·1	652·7	811·2	980·3	1159·
	C	0·956	1·000	1·034	1·061	1·085	1·105	1·122
0·1	V	1·307	1·525	1·723	1·903	2·071	2·230	2·378
	Q	209·1	305·0	413·5	532·8	662·7	802·8	951·2
	C	0·947	0·994	1·031	1·061	1·086	1·109	1·128
0·05	V	0·903	1·302	1·210	1·345	1·472	1·591	1·703
	Q	144·5	260·4	290·4	376·6	471·0	572·8	681·2
	C	0·925	0·980	1·024	1·060	1·091	1·118	1·142

V and Q are always in feet

TABLE VIII.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, in new Rubble, or in old Brickwork, or Ashlar.

width of 80 feet.

N=0·017.

S per thousand.		Depths of water in feet. 5·5	6·	6·5	7·	7·5	8·	9·
0·8	V	6·991	7·333	7·657	7·960	8·259	8·537	9·083
	Q	3076·	3520·	3982·	4458·	4955·	5464·	6538·
	C	1·124	1·135	1·145	1·153	1·162	1·169	1·185
0·6	V	6·060	6·356	6·636	6·906	7·158	7·405	7·873
	Q	2666·	3051·	3451·	3867·	4295·	4739·	5669·
	C	1·125	1·136	1·146	1·155	1·163	1·171	1·186
0·5	V	5·537	5·808	6·064	6·315	6·547	6·766	7·199
	Q	2436·	2788·	3153·	3536·	3928·	4330·	5183·
	C	1·126	1·137	1·147	1·157	1·165	1·172	1·188
0·4	V	4·956	5·203	5·550	5·658	5·865	6·067	6·455
	Q	2181·	2497·	2886·	3168·	3519·	3883·	4548·
	C	1·127	1·139	1·149	1·159	1·167	1·175	1·191
0·3	V	4·304	4·514	4·713	4·912	5·097	5·272	5·600
	Q	1894·	2167·	2451·	2751·	3058·	3374·	4032·
	C	1·130	1·141	1·151	1·162	1·171	1·179	1·193
0·25	V	3·936	4·129	4·314	4·496	4·662	4·825	5·129
	Q	1732·	1982·	2203·	2518·	2797·	3088·	3693·
	C	1·132	1·143	1·154	1·165	1·173	1·182	1·197
0·2	V	3·527	3·702	3·872	4·035	4·183	4·331	4·607
	Q	1552·	1777·	2013·	2260·	2510·	2772·	3317·
	C	1·134	1·146	1·158	1·169	1·177	1·186	1·202
0·15	V	3·066	3·220	3·368	3·513	3·647	3·775	4·016
	Q	1349·	1546·	1751·	1967·	2188·	2416·	2892·
	C	1·138	1·151	1·163	1·175	1·185	1·194	1·210
0·1	V	2·518	2·649	2·777	2·895	2·983	3·116	3·322
	Q	1108·	1272·	1444·	1621·	1790·	1994·	2392·
	C	1·145	1·160	1·174	1·186	1·197	1·207	1·226
0·05	V	1·808	1·907	2·005	2·097	2·187	2·268	2·427
	Q	795·5	915·4	1043·	1174·	1312·	1452·	1747·
	C	1·163	1·182	1·199	1·215	1·231	1·242	1·266

and cubic feet per second.

TABLE VIII.

Mean Velocities of Discharge (V), Quantities dis-

For Canals, Channels, and Aqueducts of Rectangular

For a Bed-

N=0·017.

S per thousand.		Depths of water in feet. 2·	3·	3·5	4·	4·5	5·	5·5
0·5	V	3·017	3·912	4·303	4·664	5·006	5·320	5·624
	Q	603·4	1174·	1506·	1866·	2253·	2660·	3093·
	C	0·973	1·040	1·064	1·084	1·102	1·116	1·130
0·45	V	2·860	3·712	4·083	4·426	4·750	5·047	5·336
	Q	572·0	1114·	1429·	1770·	2138·	2523·	2935·
	C	0·972	1·040	1·064	1·084	1·102	1·116	1·130
0·4	V	2·693	3·500	3·848	4·177	4·481	4·763	5·035
	Q	538·5	1050·	1347·	1671·	2016·	2381·	2769·
	C	0·971	1·040	1·064	1·085	1·103	1·117	1·131
0·35	V	2·516	3·270	3·647	3·907	4·193	4·460	4·714
	Q	503·2	981·0	1276·	1563·	1887·	2230·	2593·
	C	0·970	1·039	1·064	1·085	1·103	1·118	1·132
0·3	V	2·328	3·028	3·384	3·617	3·885	4·131	4·368
	Q	465·5	908·4	1184·	1447·	1748·	2066·	2402·
	C	0·969	1·039	1·064	1·085	1·104	1·119	1·133
0·25	V	2·121	2·763	3·043	3·305	3·549	3·779	3·995
	Q	424·2	828·9	1065·	1322·	1597·	1889·	2197·
	C	0·967	1·039	1·064	1·086	1·105	1·121	1·135
0·2	V	1·891	2·469	2·722	2·959	3·178	3·386	3·582
	Q	378·3	740·7	952·7	1184·	1430·	1693·	1970·
	C	0·964	1·038	1·064	0·087	1·106	1·123	1·138
0·15	V	1·629	2·136	2·393	2·563	2·757	2·940	3·113
	Q	325·9	640·8	837·5	1025·	1241·	1470·	1712·
	C	0·959	1·037	1·064	1·088	1·108	1·126	1·142
0·1	V	1·318	1·742	1·925	2·098	2·262	2·413	2·560
	Q	263·5	522·6	673·7	839·2	1018·	1207·	1408·
	C	0·950	1·035	1·064	1·090	1·113	1·132	1·150
0·05	V	0·911	1·224	1·361	1·492	1·614	1·731	1·840
	Q	182·3	367·2	476·3	596·8	726·3	865·6	1012·
	C	0·929	1·029	1·064	1·096	1·123	1·148	1·169

V and Q are always in feet

TABLE VIII.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, in new Rubble, or in old Brickwork, or Ashlar.

width of 100 feet.

N=0·017.

S per thousand.		Depths of water in feet. 6·	6·5	7·	7·5	8·	9·	10·
0·5	V	5·906	6·178	6·433	6·676	6·911	7·354	7·765
	Q	3544·	4016·	4503·	5007·	5529·	6619·	7765·
	C	1·141	1·152	1·161	1·169	1·177	1·191	1·203
0·45	V	5·607	5·861	6·107	6·339	6·563	6·983	7·373
	Q	3364·	3810·	4275·	4754·	5250·	6285·	7373·
	C	1·142	1·152	1·162	1·170	1·178	1·192	1·204
0·4	V	5·291	5·531	5·764	5·981	6·199	6·596	6·962
	Q	3175·	3595·	4035·	4485·	4959·	5936·	6962·
	C	1·143	1·153	1·163	1·171	1·180	1·194	1·206
0·35	V	4·954	5·182	5·396	5·605	5·807	6·180	6·524
	Q	2972·	3368·	3777·	4203·	4646·	5562·	6524·
	C	1·144	1·155	1·164	1·173	1·182	1·196	1·208
0·3	V	4·590	4·806	5·004	5·197	5·386	5·730	6·055
	Q	2754·	3124·	3503·	3897·	4309·	5157·	6055·
	C	1·145	1·157	1·166	1·175	1·184	1·198	1·211
0·25	V	4·197	4·395	4·580	4·758	4·928	5·249	5·545
	Q	2518·	2857·	3206·	3568·	3942·	4724·	5545·
	C	1·147	1·159	1·169	1·178	1·187	1·202	1·215
0·2	V	3·767	3·945	4·110	4·269	4·426	4·715	4·984
	Q	2260·	2564·	2877·	3201·	3541·	4244·	4984·
	C	1·151	1·163	1·173	1·182	1·192	1·207	1·221
0·15	V	3·274	3·430	3·581	3·721	3·856	4·113	4·753
	Q	1964·	2230·	2507·	2790·	3085·	3702·	4753·
	C	1·155	1·168	1·180	1·190	1·199	1·216	1·231
0·1	V	2·697	2·828	2·954	3·072	3·189	3·406	3·606
	Q	1618·	1838·	2068·	2304·	2551·	3065·	3606·
	C	1·165	1·179	1·192	1·203	1·214	1·233	1·249
0·05	V	1·945	2·047	2·141	2·234	2·323	2·490	2·645
	Q	1167·	1332·	1499·	1675·	1858·	2241·	2645·
	C	1·188	1·207	1·222	1·237	1·251	1·275	1·296

and cubic feet per second.

TABLE VIII.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals, Channels, and Aqueducts of Rectangular

For a Bed-

N=0·017.

S per thousand.		Depths of water in feet. 2·	3·	4·	4·5	5·	5·5	6·
0·5	V	3·046	3·961	4·742	5·096	5·427	5·747	6·045
	Q	913·8	1782·	2845·	3440·	4069·	4741·	5441·
	C	0·976	1·043	1·088	1·106	1·121	1·135	1·147
0·45	V	2·887	3·758	4·498	4·834	5·149	5·450	5·735
	Q	866·1	1688·	2699·	3263·	3861·	4498·	5162·
	C	0·975	1·043	1·088	1·106	1·121	1·135	1·147
0·4	V	2·718	3·543	4·244	4·562	4·858	5·144	5·412
	Q	815·4	1594·	2546·	3079·	3643·	4244·	4871·
	C	0·974	1·043	1·089	1·107	1·122	1·136	1·148
0·35	V	2·541	3·311	3·970	4·267	4·549	4·815	5·066
	Q	762·3	1490·	2382·	2880·	3411·	3972·	4559·
	C	0·973	1·042	1·089	1·107	1·123	1·137	1·149
0·3	V	2·349	3·066	3·679	3·954	4·215	4·466	4·698
	Q	704·7	1380·	2207·	2669·	3160·	3684·	4228·
	C	0·972	1·042	1·090	1·108	1·124	1·139	1·151
0·25	V	2·141	2·795	3·358	3·714	3·854	4·084	4·297
	Q	642·3	1258·	2015·	2507·	2890·	3369·	3867·
	C	0·970	1·041	1·090	1·109	1·126	1·141	1·153
0·2	V	1·907	2·498	3·007	3·237	3·454	3·660	3·857
	Q	572·1	1124·	1804·	2185·	2590·	3019·	3471·
	C	0·966	1·040	1·091	1·111	1·128	1·143	1·157
0·15	V	1·644	2·161	2·609	2·812	3·001	3·183	3·355
	Q	493·2	972·4	1565·	1898·	2251·	2626·	3020·
	C	0·962	1·039	1·093	1·114	1·132	1·148	1·162
0·1	V	1·330	1·762	2·136	2·305	2·466	2·617	2·762
	Q	399·0	792·9	1282·	1556·	1849·	2159·	2486·
	C	0·953	1·037	1·096	1·119	1·139	1·156	1·172
0·05	V	0·921	1·238	1·519	1·648	1·768	1·884	1·996
	Q	276·3	557·1	911·4	1112·	1326·	1554·	1796·
	C	0·933	1·031	1·102	1·131	1·155	1·177	1·198

V and Q are always in feet

.TABLE VIII.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, in new Rubble, or in old Brickwork, or Ashlar.

-width of 150 feet.

N=0·017.

S per thousand.		Depths of water in feet. 6·5	7·	7·5	8·	9·	10·	12·
0·5	V	6·326	6·599	6·865	7·149	7·594	8·037	8·846
	Q	6168·	6929·	7723·	8579·	10252·	12055·	15923·
	C	1·157	1·167	1·176	1·185	1·198	1·210	1·230
0·45	V	6·007	6·266	6·519	6·787	7·210	7·631	8·406
	Q	5857·	6579·	7334·	8144·	9734·	11446·	15131·
	C	1·158	1·168	1·177	1·186	1·199	1·211	1·232
0·4	V	5·669	5·914	6·157	6·410	6·808	7·206	7·938
	Q	5527·	6210·	6927·	7692·	9191·	10809·	14288·
	C	1·159	1·169	1·179	1·188	1·201	1·213	1·234
0·35	V	5·307	5·541	5·769	6·006	6·381	6·752	7·437
	Q	5174·	5818·	6490·	7207·	8614·	10128·	13387·
	C	1·160	1·171	1·181	1·190	1·203	1·215	1·236
0·3	V	4·922	5·139	5·350	5·570	5·921	6·272	6·908
	Q	4799·	5396·	6019·	6684·	7993·	9408·	12434·
	C	1·162	1·173	1·183	1·192	1·206	1·219	1·240
0·25	V	4·505	4·699	4·896	5·102	5·423	5·744	6·326
	Q	4392·	4934·	5508·	6121·	7321·	8616·	11387·
	C	1·165	1·175	1·186	1·196	1·210	1·223	1·244
0·2	V	4·042	4·217	4·393	4·582	4·871	5·167	5·695
	Q	3941·	4428·	4942·	5497·	6576·	7750·	10251·
	C	1·169	1·179	1·190	1·201	1·215	1·230	1·252
0·15	V	3·519	3·677	3·828	3·996	4·253	4·511	4·979
	Q	3431·	3861·	4307·	4795·	5742·	6766·	8962·
	C	1·175	1·187	1·197	1·209	1·225	1·240	1·264
0·1	V	2·903	3·036	3·165	3·302	3·521	3·740	4·140
	Q	2830·	3188·	3561·	3962·	4753·	5610·	7452·
	C	1·187	1·200	1·212	1·224	1·242	1·259	1·287
0·05	V	2·102	2·206	2·304	2·412	2·580	2·751	3·062
	Q	2050·	2316·	2592·	2894·	3483·	4126·	5612·
	C	1·216	1·233	1·248	1·264	1·287	1·310	1·346

and cubic feet per second.

TABLE VIII.

Mean Velocities of Discharge (V), Quantities dis-

For Canals, Channels, and Aqueducts of Rectangular

For a Bed-

N=0·017.

S per thousand.		Depths of water in feet. 2·	3·	4·	4·5	5·	5·5	6·
	V	3·059	3·988	4·780	5·141	5·485	5·804	6·113
0·5	Q	1224·	2392·	3824·	4627·	5485·	6384·	7336·
	C	0·977	1·045	1·090	1·108	1·124	1·137	1·149
	V	2·900	3·783	4·534	4·877	5·203	5·511	5·804
0·45	Q	1160·	2270·	3627·	4389·	5203·	6062·	6965·
	C	0·976	1·045	1·090	1·108	1·124	1·138	1·150
	V	2·731	3·567	4·279	4·602	4·911	5·201	5·476
0·4	Q	1092·	2140·	3423·	4142·	4911·	5721·	6571·
	C	0·975	1·045	1·091	1·109	1·125	1·139	1·151
	V	2·552	3·333	4·017	4·309	4·596	4·869	5·128
0·35	Q	1021·	2000·	3213·	3878·	4596·	5356·	6154·
	C	0·974	1·044	1·091	1·110	1·126	1·140	1·152
	V	2·360	3·086	3·710	3·993	4·259	4·513	4·756
0·3	Q	944·0	1852·	2968·	3594·	4259·	4964·	5707·
	C	0·973	1·044	1·092	1·111	1·127	1·141	1·154
	V	2·150	2·818	3·386	3·648	3·896	4·126	4·349
0·25	Q	860·0	1691·	2709·	3283·	3896·	4538·	5219·
	C	0·971	1·044	1·092	1·112	1·129	1·143	1·156
	V	1·915	2·517	3·031	3·266	3·490	3·700	3·903
0·2	Q	766·0	1510·	2425·	2939·	3490·	4070·	4684·
	C	0·967	1·043	1·093	1·113	1·131	1·146	1·160
	V	1·652	2·178	2·628	2·836	3·034	3·218	3·398
0·15	Q	660·8	1307·	2102·	2552·	3034·	3540·	4078·
	C	0·963	1·042	1·095	1·116	1·135	1·151	1·166
	V	1·337	1·775	2·153	2·326	2·493	2·648	2·798
0·1	Q	534·8	1065·	1722·	2093·	2493·	2913·	3358·
	C	0·954	1·040	1·098	1·121	1·142	1·160	1·176
	V	0·925	1·248	1·533	1·664	1·788	1·909	2·023
0·05	Q	370·0	748·8	1226·	1498·	1788·	2100·	2428·
	C	0·934	1·034	1·105	1·134	1·159	1·182	1·202

V and Q are always in feet

TABLE VIII.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, in new Rubble, or in old Brickwork, or Ashlar.

width of 200 feet.

N=0·017.

S per thousand.		Depths of water in feet. 6·5	7·	7·5	8·	9·	10·	12·
0·5	V	6·408	6·691	6·964	7·224	7·718	8·185	9·033
	Q	8330·	9367·	10446·	11558·	13892·	16370·	21679·
	C	1·160	1·170	1·179	1·187	1·201	1·214	1·234
0·45	V	6·085	6·354	6·613	6·860	7·327	7·771	8·583
	Q	7911·	8896·	9919·	10976·	13189·	15542·	20600·
	C	1·161	1·171	1·180	1·188	1·202	1·215	1·236
0·4	V	5·743	5·996	6·239	6·477	6·919	7·339	8·105
	Q	7466·	8394·	9359·	10363·	12454·	14678·	19452·
	C	1·162	1·172	1·181	1·190	1·204	1·217	1·238
0·35	V	5·375	5·618	5·846	6·070	6·483	6·876	7·600
	Q	6988·	7865·	8769·	9712·	11669·	13752·	18240·
	C	1·163	1·174	1·183	1·192	1·206	1·219	1·241
0·3	V	4·985	5·211	5·421	5·629	6·022	6·387	7·059
	Q	6481·	7295·	8131·	9006·	10840·	12774·	16942·
	C	1·165	1·176	1·185	1·194	1·210	1·223	1·245
0·25	V	4·562	4·770	4·966	5·155	5·516	5·850	6·470
	Q	5931·	6678·	7449·	8248·	9929·	11700·	15528·
	C	1·168	1·179	1·189	1·198	1·214	1·227	1·250
0·2	V	4·095	4·279	4·460	4·632	4·953	5·262	5·823
	Q	5324·	5991·	6690·	7411·	8915·	10524·	13975·
	C	1·172	1·183	1·194	1·203	1·219	1·234	1·258
0·15	V	3·565	3·730	3·885	4·037	4·325	4·598	5·091
	Q	4635·	5122·	5827·	6459·	7785·	9196·	12218·
	C	1·178	1·191	1·201	1·211	1·229	1·245	1·270
0·1	V	2·940	3·080	3·213	3·340	3·584	3·814	4·233
	Q	3822·	4312·	4819·	5344·	6451·	7628·	10159·
	C	1·190	1·204	1·216	1·227	1·247	1·265	1·293
0·05	V	2·133	2·240	2·342	2·441	2·629	2·808	3·135
	Q	2773·	3136·	3513·	3906·	4732·	5616·	7524·
	C	1·221	1·238	1·254	1·268	1·294	1·317	1·354

and cubic feet per second.

TABLE VIII.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals, Channels, and Aqueducts of Rectangular

For a Bed-

N=0·017.

S per thousand.		Depths of water in feet.						
		3·	3·5	4·0	4·5	5·0	5·5	6·0
0·5	V	4·004	4·420	4·803	5·168	5·516	5·840	6·159
	Q	3003·	3868·	4803·	5814·	6895·	8030·	9234·
	C	1·046	1·071	1·091	1·109	1·125	1·138	1·151
0·45	V	3·798	4·192	4·556	4·902	5·234	5·546	5·846
	Q	2849·	3668·	4556·	5514·	6542·	7625·	8770·
	C	1·046	1·071	1·091	1·909	1·125	1·131	1·152
0·4	V	3·590	3·953	4·299	4·626	4·938	5·233	5·517
	Q	2693·	3459·	4299·	5205·	6172·	7195·	8276·
	C	1·046	1·071	1·092	1·110	1·126	1·140	1·153
0·35	V	3·347	3·698	4·023	4·332	4·582	4·999	5·166
	Q	2510·	3236·	4023·	4875·	5727·	6874·	7750·
	C	1·045	1·071	1·092	1·111	1·127	1·141	1·154
0·3	V	3·098	3·424	3·727	4·014	4·287	4·543	4·791
	Q	2324·	2996·	3727·	4516·	5359·	6247·	7186·
	C	1·045	1·071	1·093	1·112	1·129	1·143	1·156
0·25	V	2·828	3·125	3·406	3·667	3·921	4·155	4·382
	Q	2121·	2734·	3406·	4126·	4901·	5713·	6573·
	C	1·045	1·071	1·094	1·113	1·131	1·145	1·158
0·2	V	2·528	2·798	3·048	3·286	3·513	3·726	3·932
	Q	1896·	2448·	3048·	3697·	4·392	5124·	5898·
	C	1·044	1·072	1·095	1·115	1·133	1·148	1·162
0·15	V	2·186	2·423	2·645	2·851	3·053	3·238	3·422
	Q	1640·	2120·	2645·	3207·	3816·	4453·	5133·
	C	1·043	1·072	1·097	1·117	1·137	1·152	1·168
0·1	V	1·782	1·981	2·166	2·340	2·509	2·667	2·819
	Q	1337·	1733·	2166·	2633·	3136·	3667·	4228·
	C	1·041	1·073	1·100	1·123	1·144	1·162	1·178
0·05	V	1·253	1·402	1·541	1·674	1·801	1·922	2·039
	Q	940·	1227·	1541·	1884·	2251·	2642·	3058·
	C	1·035	1·074	1·107	1·136	1·161	1·184	1·205

V and Q are always in feet

TABLE VIII.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, in new Rubble, or in old Brickwork, or Ashlar.

width of 250 feet.

N=0·017.

S per thousand.		Depths of water in feet. 6·5	7·0	8·	9·	10·	12·	14·
0·5	V	6·460	6·747	7·290	7·793	8·274	9·153	9·941
	Q	10497·	11808·	14579·	17534·	20684·	27458·	34795·
	C	1·162	1·172	1·189	1·203	1·216	1·237	1·253
0·45	V	6·128	6·406	6·921	7·406	7·862	8·697	9·446
	Q	9959·	11210·	13842·	16663·	19656·	26090·	33062·
	C	1·162	1·173	1·190	1·205	1·218	1·239	1·255
0·4	V	5·782	6·045	6·537	6·995	7·425	8·213	8·927
	Q	9396·	10579·	13074·	15738·	18562·	24639·	31244·
	C	1·163	1·174	1·192	1·207	1·220	1·241	1·258
0·35	V	5·418	5·659	6·124	6·553	6·957	7·700	8·371
	Q	8805·	9903·	12248·	14744·	17392·	23101·	32797·
	C	1·165	1·175	1·194	1·209	1·222	1·244	1·261
0·3	V	5·025	5·248	5·680	6·082	6·457	7·152	7·775
	Q	8166·	9184·	11360·	13684·	16142·	21457·	27211·
	C	1·167	1·177	1·196	1·212	1·225	1·248	1·265
0·25	V	4·599	4·804	5·199	5·571	5·918	6·557	7·132
	Q	7474·	8407·	10398·	12534·	14794·	19671·	24961·
	C	1·170	1·180	1·199	1·216	1·230	1·253	1·271
0·2	V	4·128	4·315	4·673	5·008	5·323	5·900	6·423
	Q	6708·	7551·	9346·	11268·	13307·	17701·	22481·
	C	1·174	1·185	1·205	1·222	1·237	1·261	1·280
0·15	V	3·596	3·762	4·077	4·371	4·648	5·158	5·622
	Q	5844·	6583·	8153·	9835·	11619·	15474·	19678·
	C	1·181	1·193	1·214	1·232	1·247	1·273	1·294
0·1	V	2·966	3·106	3·373	7·245	3·859	4·292	4·687
	Q	4819·	5435·	6745·	8151·	9646·	12875·	16404·
	C	1·193	1·206	1·230	1·250	1·268	1·297	1·321
0·05	V	2·152	2·260	2·466	2·662	2·843	3·182	3·490
	Q	3497·	3955·	4933·	5889·	7107·	9547·	12215·
	C	1·224	1·241	1·272	1·299	1·321	1·360	1·391

and cubic feet per second.

TABLE VIII.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals, Channels, and Aqueducts of Rectangular

For a Bed-

N=0·017.

S per thousand.		Depths of water in feet. 3·	3·5	4·	4·5	5·	5·5	6·
0·5	V	4·015	4·433	4·820	5·188	5·539	5·872	6·187
	Q	3614·	4655·	5784·	7004·	8308·	9689·	11138·
	C	1·047	1·072	1·092	1·110	1·126	1·140	1·152
0·45	V	3·809	4·205	4·572	4·922	5·255	5·570	5·875
	Q	3428·	4416·	5486·	6645·	7882·	9191·	10575·
	C	1·047	1·072	1·092	1·110	1·126	1·140	1·153
0·4	V	3·587	3·965	4·314	4·645	4·959	5·257	5·544
	Q	3228·	4164·	5177·	6271·	7438·	8674·	9979·
	C	1·046	1·072	1·093	1·111	1·127	1·141	1·154
0·35	V	3·356	3·709	4·036	4·348	4·643	4·921	5·189
	Q	3022·	3895·	4843·	5870·	6964·	8120·	9340·
	C	1·046	1·072	1·093	1·112	1·128	1·142	1·155
0·3	V	3·107	3·434	3·740	4·030	4·306	4·563	4·813
	Q	2796·	3653·	4488·	5441·	6459·	7529·	8663·
	C	1·046	1·072	1·094	1·113	1·130	1·144	1·157
0·25	V	2·835	3·135	3·417	3·683	3·938	4·175	4·403
	Q	2552·	3291·	4099·	4972·	5907·	6889·	7925·
	C	1·045	1·072	1·095	1·114	1·132	1·146	1·159
0·2	V	2·534	2·803	3·059	3·299	3·528	3·742	3·951
	Q	2281·	2943·	3671·	4454·	5292·	6174·	7112·
	C	1·045	1·072	1·096	1·116	1·134	1·149	1·163
0·15	V	2·192	2·430	2·654	2·865	3·066	3·255	3·439
	Q	1973·	2552·	3185·	3868·	4599·	5371·	6190·
	C	1·044	1·073	1·098	1·119	1·138	1·154	1·169
0·1	V	1·787	1·982	2·173	2·350	2·519	2·678	2·834
	Q	1608·	2081·	2608·	3173·	3778·	4419·	5101·
	C	1·042	1·074	1·101	1·124	1·145	1·163	1·180
0·05	V	1·257	1·407	1·548	1·682	1·808	1·932	2·051
	Q	1131·	1478·	1858·	2271·	2712·	3188·	3692·
	C	1·036	1·076	1·109	1·138	1·163	1·186	1·207

V and Q are always in feet

TABLE VIII.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, in new Rubble, or in old Brickwork, or Ashlar.

width of 300 feet.

N=0·017.

S per thousand.		Depths of water in feet. 7	8	9	10	12	14	16
	V	6·785	7·334	7·852	8·340	9·234	10·04	10·78
0·5	Q	14148·	17601·	21200·	25018·	33243·	42155·	51746·
	C	1·173	1·190	1·205	1·218	1·239	1·255	1·268
	V	6·441	6·963	7·454	7·917	8·775	9·537	10·24
0·45	Q	13525·	16711·	20126·	23752·	31590·	40055·	49171·
	C	1·174	1·191	1·206	1·219	1·241	1·257	1·270
	V	6·078	6·576	7·040	7·477	8·286	9·013	9·689
0·4	Q	12764·	15782·	19008·	22433·	29349·	37853·	46506·
	C	1·175	1·193	1·208	1·221	1·243	1·260	1·274
	V	5·689	6·163	6·597	7·005	7·769	8·451	9·083
0·35	Q	11947·	14791·	17821·	21016·	27968·	35493·	43600·
	C	1·176	1·195	1·210	1·223	1·246	1·263	1·277
	V	5·281	5·719	6·128	6·507	7·216	7·849	8·443
0·3	Q	11090·	13726·	16546·	19520·	25978·	32966·	40528·
	C	1·179	1·198	1·214	1·227	1·250	1·267	1·282
	V	4·834	5·234	5·613	5·964	6·614	7·200	7·743
0·25	Q	10151·	12562·	15155·	17892·	23810·	30240·	37169·
	C	1·182	1·201	1·218	1·232	1·255	1·273	1·288
	V	4·342	4·704	5·044	5·365	5·954	6·484	6·979
0·2	Q	9118·	11290·	13619·	16094·	21434·	27234·	33401·
	C	1·187	1·207	1·224	1·239	1·263	1·282	1·298
	V	3·781	4·104	4·404	4·688	5·205	5·677	6·115
0·15	Q	7940·	9850·	11891·	14063·	18737·	23841·	29350·
	C	1·194	1·216	1·234	1·250	1·275	1·296	1·313
	V	3·125	3·395	3·648	3·886	4·333	4·732	5·107
0·1	Q	6563·	8148·	9850·	11657·	15600·	19876·	24516·
	C	1·208	1·232	1·252	1·269	1·300	1·323	1·343
	V	2·273	2·483	2·681	2·866	3·213	3·528	3·821
0·05	Q	4773·	5959·	7239·	8599·	9165·	14817·	18341·
	C	1·243	1·274	1·301	1·324	1·363	1·395	1·421

and cubic feet per second.

TABLE IX.

Mean Velocities of Discharge (V), in Feet per Second;
Quantities discharged (Q), in Cubic Feet per Second;
and Coefficients (C) of Mean Velocity.

For Canals of Trapezoidal Section, with Side Slopes of One to One, in Earth, in Class II., above the Average in Condition and Regimen; when N, the Coefficient of Roughness and Irregularity, $=0{\cdot}0225$.

General Formula, $Q = A.V = A.C.100\sqrt{RS}$.

TABLE IX.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of

For a Bed-width of 2 feet.

N=0·0225.

S per thousand.		Depths of water in feet.						
		0·5	0·75	1·	1·25	1·5	1·75	2·
5·0	V	2·015	2·590	3·070	3·495	3·878	4·228	4·568
	Q	2·519	5·34	9·210	14·19	20·36	27·74	36·54
	C	0·471	0·518	0·551	0·577	0·598	0·616	0·632
3·0	V	1·561	2·006	2·378	2·708	3·004	3·275	3·538
	Q	1·951	4·132	7·134	10·99	15·77	21·48	28·30
	C	0·471	0·518	0·551	0·577	0·598	0·616	0·632
2·0	V	1·274	1·638	1·942	2·210	2·452	2·674	2·889
	Q	1·592	3·374	5·826	8·973	12·87	17·54	23·11
	C	0·471	0·518	0·551	0·577	0·598	0·616	0·632
1·0	V	·9010	1·158	1·373	1·564	1·734	1·890	2·043
	Q	1·126	1·341	4·119	6·300	9·104	12·40	16·34
	C	0·471	0·518	0·551	0·577	0·598	0·616	0·632
0·8	V	·8024	1·032	1·224	1·398	1·546	1·685	1·824
	Q	1·003	2·126	3·672	5·676	8·116	11·05	14·59
	C	0·469	0·516	0·549	0·575	0·596	0·641	0·631
0·6	V	·6906	·8885	1·054	1·201	1·334	1·455	1·575
	Q	·8632	1·830	3·162	4·876	7·004	9·545	12·60
	C	0·466	0·513	0·546	0·572	0·594	0·612	0·629
0·5	V	·6264	·8063	·9585	1·092	1·214	1·324	1·433
	Q	·8080	1·661	2·875	4·433	6·373	8·685	11·46
	C	0·463	0·510	0·544	0·570	0·592	0·610	0·627
0·4	V	·5566	·7169	·8526	·9713	1·080	1·178	1·276
	Q	·6957	1·477	2·558	3·943	5·670	7·728	10·21
	C	0·460	0·507	0·541	0·567	0·589	0·607	0·624
0·2	V	·3801	·4910	·5860	·6702	·7470	·8156	·8849
	Q	·4751	1·011	1·758	2·721	3·922	5·350	7·079
	C	0·444	0·491	0·526	0·553	0·576	0·594	0·612
0·1	V	·2535	·3302	·3956	·4551	·5081	·5568	·6060
	Q	·3169	·6802	1·187	1·848	2·667	3·653	4·848
	C	0·419	0·467	0·502	0·531	0·554	0·574	0·593

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

Trapezoidal Section, with Side Slopes of One to One.

For a Bed-width of 3 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 0·5	0·75	1·	1·5	2·	2·5	3·
5·0	V	2·149	2·792	3·321	4·191	4·932	5·568	6·152
	Q	3·761	7·845	13·28	28·29	49·32	76·56	110·7
	C	0·483	0·533	0·567	0·614	0·649	0·674	0·695
3·0	V	1·665	2·163	2·572	3·247	3·820	4·313	4·765
	Q	2·914	6·078	10·29	21·92	38·20	59·30	85·77
	C	0·483	0·533	0·567	0·614	0·649	0·674	0·695
2·0	V	1·359	1·766	2·100	2·651	3·119	3·522	3·891
	Q	2·378	4·962	8·400	17·89	31·19	48·43	70·04
	C	0·483	0·533	0·567	0·614	0·649	0·674	0·695
1·0	V	·9612	1·249	1·485	1·874	2·206	2·490	2·752
	Q	1·682	3·510	5·940	12·65	22·06	34·24	49·54
	C	0·483	0·533	0·567	0·614	0·649	0·674	0·695
0·8	V	·8562	1·113	1·324	1·671	1·970	2·224	2·457
	Q	1·498	3·127	5·296	11·28	19·70	30·58	44·23
	C	0·481	0·531	0·565	0·612	0·648	0·673	0·694
0·6	V	·7366	·9583	1·140	1·443	1·700	1·920	2·122
	Q	1·289	2·693	4·564	9·740	17·00	26·40	38·20
	C	0·478	0·528	0·562	0·610	0·646	0·671	0·692
0·5	V	·6697	·8716	1·037	1·313	1·547	1·750	1·934
	Q	1·172	2·449	4·148	8·863	15·47	24·06	34·81
	C	0·476	0·526	0·560	0·608	0·644	0·670	0·691
0·4	V	·5942	·7736	·9229	1·168	1·380	1·561	1·725
	Q	1·040	2·174	3·692	7·884	13·80	21·46	31·05
	C	0·472	0·522	0·557	0·605	0·642	0·668	0·689
0·2	V	·4058	·5313	·6349	·8086	·9576	1·087	1·204
	Q	·7101	1·493	2·540	5·458	9·576	14·95	21·67
	C	0·456	0·507	0·542	0·592	0·630	0·658	0·680
0·1	V	·2711	·3579	·4297	·5525	·6579	·7498	·8351
	Q	·4744	1·006	1·719	3·729	6·579	10·31	15·03
	C	0·431	0·483	0·519	0·572	0·612	0·642	0·667

and cubic feet per second.

TABLE IX.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of

For a Bed-width of 4 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 1·	1·5	2·	2·5	3·	3·5	4·
5·0	V	3·485	4·490	5·195	5·877	6·475	7·036	7·555
	Q	17·42	37·04	62·34	95·50	136·0	184·7	241·8
	C	0·576	0·625	0·659	0·686	0·706	0·724	0·739
3·0	V	2·699	3·477	4·024	4·552	5·015	5·450	5·851
	Q	13·49	28·68	48·29	73·97	105·3	143·1	187·2
	C	0·576	0·625	0·659	0·686	0·706	0·724	0·739
2·0	V	2·204	2·840	3·286	3·717	4·095	4·450	4·778
	Q	11·02	23·43	39·43	60·40	85·99	116·8	152·9
	C	0·576	0·625	0·659	0·686	0·706	0·724	0·739
1·0	V	1·559	2·008	2·324	2·628	2·895	3·146	3·379
	Q	7·793	16·57	27·89	42·70	60·79	82·58	108·1
	C	0·576	0·625	0·659	0·686	0·706	0·724	0·739
0·8	V	1·389	1·790	2·071	2·347	2·586	2·810	3·018
	Q	6·943	14·77	24·85	38·14	54·31	73·76	96·58
	C	0·574	0·623	0·657	0·685	0·705	0·723	0·738
0·6	V	1·197	1·544	1·789	2·027	2·237	2·431	2·610
	Q	5·983	12·74	21·47	32·94	46·98	63·81	83·52
	C	0·571	0·621	0·655	0·683	0·704	0·722	0·737
0·5	V	1·088	1·384	1·630	1·847	2·039	2·216	2·379
	Q	5·440	11·42	19·56	30·01	42·82	58·17	76·13
	C	0·569	0·619	0·654	0·682	0·703	0·721	0·736
0·4	V	·9684	1·234	1·454	1·648	1·818	1·979	2·125
	Q	4·842	10·18	17·45	26·78	38·18	51·95	68·00
	C	0·566	0·617	0·652	0·680	0·701	0·720	0·735
0·2	V	·6679	·8555	1·011	1·149	1·273	1·386	1·493
	Q	3·339	7·058	12·13	18·67	26·73	36·38	47·78
	C	0·552	0·605	0·641	0·671	0·694	0·713	0·730
0·1	V	·4537	·5850	·6958	·7963	·8832	·9645	1·042
	Q	2·268	4·826	8·350	12·94	18·55	25·32	33·34
	C	0·530	0·585	0·624	0·657	0·681	0·702	0·721

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

Section, with Side Slopes of One to One.

For a Bed-width of 5 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 1·	2·	2·5	3·	3·5	4·	5·
5·	V	3·614	5·407	6·107	6·736	7·314	7·857	8·822
	Q	21·68	75·70	114·5	161·7	217·6	282·8	441·1
	C	0·584	0·667	0·693	0·714	0·732	0·748	0·772
3·	V	2·800	4·188	4·730	5·218	5·666	6·086	6·834
	Q	16·80	58·63	88·69	125·2	168·6	219·1	341·7
	C	0·584	0·667	0·693	0·714	0·732	0·748	0·772
2·	V	2·286	3·419	3·862	4·260	4·626	49·70	5·580
	Q	13·72	47·87	72·41	102·2	137·6	178·9	279·0
	C	0·584	0·667	0·693	0·714	0·732	0·748	0·772
1·	V	1·616	2·418	2·731	3·012	3·271	3·514	3·946
	Q	9·696	33·85	51·21	72·29	97·31	126·5	197·3
	C	0·584	0·667	0·693	0·714	0·732	0·748	0·772
0·8	V	1·440	2·159	2·439	2·691	2·922	3·143	3·529
	Q	8·640	30·23	45·73	64·58	86·93	113·1	176·4
	C	0·582	0·666	0·692	0·713	0·731	0·748	0·772
0·6	V	1·241	1·864	2·109	2·327	2·526	2·718	3·052
	Q	7·446	26·10	39·54	55·85	75·15	97·85	152·6
	C	0·579	0·664	0·691	0·712	0·730	0·747	0·771
0·5	V	1·129	1·699	1·923	2·121	2·304	2·478	2·786
	Q	6·774	23·79	36·06	50·90	68·54	89·21	139·3
	C	0·577	0·663	0·690	0·711	0·729	0·746	0·771
0·4	V	1·005	1·515	1·714	1·892	2·057	2·213	2·489
	Q	6·030	21·21	32·14	45·41	61·19	79·67	124·4
	C	0·574	0·661	0·688	0·709	0·728	0·745	0·770
0·2	V	·6927	1·055	1·196	1·325	1·443	1·555	1·753
	Q	4·156	14·77	22·42	31·80	42·93	55·98	87·65
	C	0·560	0·651	0·679	0·702	0·722	0·740	0·767
0·1	V	·4716	·7266	·8286	·9205	1·006	1·088	1·231
	Q	2·830	10·17	15·54	22·09	29·93	39·17	61·55
	C	0·539	0·634	0·665	0·690	0·712	0·732	0·762

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES (V) OF DISCHARGE, QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-width of 6 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 1·	2·	2·5	3·	3·5	4·	5·
5·0	V	3·715	5·593	6·321	6·970	7·555	8·103	9·078
	Q	26·00	89·49	134·3	188·2	251·2	324·1	499·3
	C	0·590	0·675	0·701	0·722	0·739	0·754	0·778
3·0	V	2·877	4·332	4·896	5·399	5·851	6·278	7·042
	Q	20·14	69·31	104·0	145·8	194·5	251·1	387·3
	C	0·590	0·675	0·701	0·722	0·739	0·754	0·778
2·0	V	2·349	3·537	3·998	4·408	4·778	5·126	5·750
	Q	16·44	56·59	84·96	119·0	158·9	205·0	316·2
	C	0·590	0·675	0·701	0·722	0·739	0·754	0·778
1·0	V	1·661	2·501	2·826	3·117	3·379	3·624	4·066
	Q	11·63	40·02	60·05	84·16	112·3	145·0	223·6
	C	0·590	0·675	0·701	0·722	0·739	0·754	0·778
0·8	V	1·481	2·234	2·525	2·784	3·018	3·242	3·636
	Q	10·37	35·74	53·66	75·17	100·3	129·7	200·0
	C	0·588	0·674	0·700	0·721	0·738	0·754	0·778
0·6	V	1·276	1·929	2·180	2·408	2·610	2·804	3·149
	Q	8·932	30·86	46·32	65·02	86·78	112·2	173·2
	C	0·585	0·672	0·698	0·720	0·737	0·753	0·778
0·5	V	1·161	1·758	1·987	2·195	2·379	2·556	2·871
	Q	8·127	28·13	42·22	59·26	79·10	102·2	157·9
	C	0·583	0·671	0·697	0·719	0·736	0·752	0·777
0·4	V	1·033	1·568	1·772	1·960	2·125	2·283	2·568
	Q	7·231	25·09	37·65	52·92	70·66	91·32	141·2
	C	0·580	0·669	0·695	0·718	0·735	0·751	0·777
0·2	V	·7138	1·094	1·239	1·375	1·493	1·606	1·811
	Q	4·997	17·50	26·33	37·12	49·64	64·24	99·60
	C	0·567	0·660	0·687	0·712	0·730	0·747	0·775
0·1	V	·4856	·7536	·8593	·9541	1·042	11·23	1·274
	Q	3·399	12·06	18·26	25·76	34·65	44·92	70·07
	C	0·545	0·643	0·674	0·699	0·721	0·739	0·771

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

For a Bed-width of 8 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 1·	2·	2·5	3·	3·5	4·	5·
5·0	V	3·842	5·869	6·636	7·324	7·941	8·530	9·559
	Q	34·58	117·4	174·2	241·7	319·6	409·4	621·3
	C	0·596	0·686	0·711	0·732	0·749	0·765	0·789
3·	V	2·976	4·556	5·140	5·673	6·152	6·606	7·405
	Q	26·78	91·12	134·9	187·2	247·6	317·1	481·3
	C	0·596	0·686	0·711	0·732	0·749	0·765	0·789
2·	V	2·430	3·712	4·197	4·632	5·023	5·394	6·046
	Q	21·87	74·24	110·2	152·8	202·2	258·9	393·0
	C	0·596	0·686	0·711	0·732	0·749	0·765	0·789
1·	V	1·718	2·625	2·918	3·275	3·552	3·814	4·275
	Q	15·46	52·50	77·91	108·1	143·0	183·1	277·9
	C	0·596	0·686	0·711	0·732	0·749	0·765	0·789
0·8	V	1·531	2·344	2·651	2·925	3·177	3·407	3·823
	Q	13·78	46·88	69·59	96·52	127·9	163·5	248·5
	C	0·594	0·685	0·710	0·731	0·749	0·764	0·789
0·6	V	1·322	2·024	2·292	2·530	2·747	2·947	3·311
	Q	11·90	40·48	60·16	83·49	110·6	141·4	215·2
	C	0·592	0·683	0·709	0·730	0·748	0·763	0·789
0·5	V	1·202	1·845	2·089	2·310	2·505	2·690	3·023
	Q	10·82	36·90	54·84	76·23	100·8	129·1	196·5
	C	0·590	0·682	0·708	0·730	0·747	0·763	0·789
0·4	V	1·070	1·646	1·864	2·060	2·237	2·402	2·700
	Q	9·630	32·92	48·93	67·98	90·04	115·3	175·5
	C	0·587	0·680	0·706	0·728	0·746	0·762	0·788
0·2	V	·7399	1·148	1·306	1·445	1·574	1·692	1·907
	Q	6·659	22·96	34·28	47·68	63·35	81·22	123·9
	C	0·574	0·671	0·699	0·722	0·742	0·759	0·787
0·1	V	·5034	·7938	·9048	1·007	1·101	1·187	1·345
	Q	4·530	15·88	23·75	33·23	44·31	56·98	87·42
	C	0·552	0·656	0·686	0·712	0·734	0·753	0·785

and cubic feet per second.

TABLE IX.

Mean Velocities (V) of Discharge, Quantities dis-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-width of 10 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 1·	2·	3·	3·5	4·	4·5	5·
2·0	V	2·488	3·826	4·807	5·224	5·604	5·956	6·283
	Q	27·37	91·82	187·5	246·8	313·8	388·6	471·2
	C	0·601	0·691	0·740	0·758	0·773	0·786	0·797
1·5	V	2·156	3·313	4·163	4·524	4·854	5·158	5·440
	Q	23·72	79·51	162·3	213·7	271·8	336·5	408·0
	C	0·601	0·691	0·740	0·758	0·773	0·786	0·797
1·0	V	1·760	2·705	3·399	3·694	3·962	4·211	4·442
	Q	19·36	64·92	132·6	174·5	221·9	274·8	333·1
	C	0·601	0·691	0·740	0·758	0·773	0·786	0·797
0·8	V	1·869	2·416	3·041	3·304	3·544	3·767	3·973
	Q	17·26	57·98	118·6	156·1	198·5	245·8	298·0
	C	0·599	0·690	0·740	0·758	0·773	0·786	0·797
0·6	V	1·353	2·090	2·629	2·858	3·066	3·262	3·441
	Q	14·88	50·16	102·5	135·0	171·7	212·8	258·1
	C	0·597	0·689	0·739	0·757	0·772	0·786	0·797
0·4	V	1·096	1·698	2·141	23·30	2·503	2·659	2·809
	Q	12·06	40·75	83·50	110·1	140·2	173·5	210·7
	C	0·592	0·686	0·737	0·756	0·772	0·785	0·797
0·3	V	·9415	1·465	1·849	2·015	2·165	2·304	2·430
	Q	10·36	35·16	72·11	95·21	121·2	150·3	182·2
	C	0·587	0·683	0·735	0·755	0·771	0·785	0·796
0·2	V	·7585	1·187	1·501	1·643	1·762	1·878	1·984
	Q	8·343	28·49	58·54	77·63	98·67	122·5	148·8
	C	0·579	0·678	0·731	0·751	0·769	0·784	0·796
0·1	Q	·5167	·8208	1·050	1·148	1·238	1·321	1·401
	C	5·684	19·70	40·95	54·24	69·33	86·19	105·1
	V	0·558	0·663	0·723	0·745	0·764	0·780	0·795
0·05	V	·3475	·5617	·7281	·8004	8·675	·9296	·9881
	Q	3·811	13·48	28·39	37·82	48·58	60·66	74·11
	C	0·529	0·642	0·709	0·735	0·757	0·776	0·793

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

For a Bed-width of 12 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 1·	2·	3·	3·5	4·	4·5	5.
2·0	V	2·534	3·925	4·952	5·384	5·772	6·138	6·484
	Q	32·94	109·9	222·8	292·1	369·4	455·7	551·1
	C	0·605	0·697	0·747	0·765	0·779	0·792	0·804
1·5	V	2·194	3·399	4·288	4·663	4·998	5·316	5·615
	Q	28·52	95·17	193·0	252·9	319·9	394·7	477·3
	C	0·605	0·697	0·747	0·765	0·779	0·792	0·804
1·0	V	1·791	2·775	3·501	3·807	4·081	4·340	4·585
	Q	23·28	77·70	157·5	206·5	261·2	322·2	389·7
	C	0·605	0·697	0·747	0·765	0·779	0·792	0·804
0·8	V	1·597	2·479	3·131	3·405	3·650	3·882	4·101
	Q	20·76	69·41	140·9	184·7	233·6	288·2	348·6
	C	0·603	0·696	0·747	0·765	0·779	0·792	0·804
0·6	V	1·379	2·144	2·709	2·945	3·157	3·362	3·551
	Q	17·93	60·03	121·9	159·8	202·0	249·6	301·8
	C	0·601	0·695	0·746	0·764	0·778	0·792	0·804
0·4	V	1·116	1·743	2·205	2·402	2·578	2·745	2·900
	Q	14·51	48·80	99·22	130·3	165·0	203·8	246·5
	C	0·596	0·692	0·744	0·763	0·778	0·792	0·804
0·3	V	·9602	1·503	1·905	2·077	2·230	2·374	2·511
	Q	12·48	42·08	85·72	112·7	142·7	176·3	213·4
	C	0·592	0·689	0·742	0·762	0·777	0·791	0·804
0·2	V	·7732	1·216	1·549	1·693	1·816	1·936	2·050
	Q	10·05	34·05	69·70	91·84	116·2	143·7	174·2
	C	0·584	0·683	0·739	0·760	0·775	0·790	0·804
0·1	V	·5266	·8423	1·083	1·147	1·279	1·366	1·448
	Q	6·846	23·58	48·73	62·22	81·86	101·4	123·1
	C	0·562	0·669	0·731	0·753	0·772	0·788	0·803
0·05	V	·3528	·5776	·7525	·8273	·8970	·9628	1·024
	Q	4·586	16·17	33·86	44·88	57·41	71·49	87·04
	C	0·533	0·649	0·718	0·744	0·766	0·786	0·803

and cubic feet per second.

TABLE IX.

MEAN VELOCITIES (V) OF DISCHARGE, QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-width of 14 feet.

N=0·0225.

S per thousand.		Depths of water in feet.						
		1	2	3	4	5	6	7
2·0	V	2·566	3·994	5·058	5·914	6·647	7·289	7·872
	Q	38·49	127·8	257·9	425·8	631·5	874·7	1157·2
	C	0·608	0·700	0·751	0·784	0·809	0·828	0·844
1·5	V	2·222	3·459	4·380	5·121	5·757	6·313	6·818
	Q	33·33	110·7	223·4	368·7	546·9	755·6	1002·2
	C	0·608	0·700	0·751	0·784	0·809	0·828	0·844
1·0	V	1·815	2·824	3·576	4·182	4·700	5·154	5·566
	Q	27·22	90·37	182·4	301·1	446·5	618·5	818·2
	C	0·608	0·700	0·751	0·784	0·809	0·828	0·844
0·8	V	1·618	2·522	3·198	3·740	4·204	4·610	5·120
	Q	24·27	80·70	163·1	269·3	399·4	553·2	752·6
	C	0·606	0·699	0·751	0·784	0·809	0·828	0·844
0·6	V	1·396	2·178	2·767	3·235	3·641	3·997	4·317
	Q	20·94	69·69	141·1	232·9	345·9	479·6	634·6
	C	0·604	0·697	0·750	0·783	0·809	0·829	0·845
0·4	V	1·131	1·771	2·252	2·638	2·973	3·268	3·634
	Q	16·96	56·67	114·8	189·9	282·4	392·2	534·2
	C	0·599	0·694	0·748	0·782	0·809	0·830	0·847
0·3	V	·9728	1·527	1·949	2·284	2·574	2·834	3·063
	Q	14·59	48·86	99·40	164·4	244·5	340·0	450·3
	C	0·595	0·691	0·747	0·782	0·809	0·831	0·848
0·2	V	·7823	1·237	1·584	1·863	2·102	2·316	2·581
	Q	11·73	39·58	80·78	134·1	199·7	277·9	379·4
	C	0·586	0·686	0·744	0·781	0·809	0·832	0·851
0·1	V	·5334	·8600	1·108	1·312	1·489	1·645	1·838
	Q	8·001	27·52	56·51	94·46	141·4	1·974	270·2
	C	0·565	0·674	0·736	0·778	0·810	0·836	0·857
0·05	V	·3574	·5899	·7817	·9234	1·053	1·171	1·317
	Q	5·361	18·88	39·87	66·48	100·0	140·5	193·6
	C	0·535	0·654	0·724	0·774	0·811	0·841	0·868

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

For a Bed-width of 16 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 1	2	3	4	5	6	7
2·0	V	2·588	4·058	5·151	6·039	6·794	7·454	8·052
	Q	43·99	146·1	293·6	483·1	713·4	1058·5	1296·4
	C	0·609	0·704	0·755	0·789	0·814	0·833	0·849
1·5	V	2·241	3·515	4·461	5·229	5·884	6·456	6·973
	Q	38·09	126·5	245·3	418·3	617·8	916·7	1122·6
	C	0·609	0·704	0·755	0·789	0·814	0·833	0·849
1·0	V	1·830	2·870	3·643	4·270	4·805	5·271	5·693
	Q	31·11	103·3	207·6	341·6	504·5	748·5	916·6
	C	0·609	0·704	0·755	0·789	0·814	0·833	0·849
0·8	V	1·632	2·563	3·258	3·819	4·297	4·715	5·092
	Q	27·74	92·27	185·7	305·5	451·2	669·5	819·8
	C	0·607	0·703	0·755	0·789	0·814	0·833	0·849
0·6	V	1·408	2·214	2·818	3·303	3·722	4·087	4·415
	Q	23·94	79·70	160·6	264·2	390·8	580·3	710·8
	C	0·605	0·701	0·754	0·788	0·814	0·834	0·850
0·4	V	1·140	1·799	2·295	2·694	3·039	3·342	3·613
	Q	19·38	64·76	130·8	215·5	319·0	474·6	581·7
	C	0·600	0·698	0·752	0·787	0·814	0·835	0·852
0·3	V	·9810	1·552	1·985	2·333	2·635	2·897	3·133
	Q	16·68	55·87	113·1	186·6	276·7	411·4	504·4
	C	0·596	0·695	0·751	0·787	0·815	0·836	0·853
0·2	V	·7889	1·259	1·614	1·942	2·152	2·369	2·567
	Q	13·41	45·32	92·00	155·4	225·9	336·4	413·3
	C	0·587	0·691	0·748	0·786	0·815	0·837	0·856
0·1	V	·5386	·8610	1·131	1·583	1·523	1·685	1·829
	Q	9·156	30·99	64·47	126·6	159·9	239·3	294·5
	C	0·567	0·668	0·741	0·784	0·816	0·842	0·863
0·05	V	·3615	·6010	·7512	·9438	1·080	1·601	1·312
	Q	6·145	21·64	42·82	75·50	113·4	227·3	211·2
	C	0·538	0·659	0·730	0·780	0·818	0·849	0·875

and cubic feet per second.

TABLE IX.

MEAN VELOCITIES (V) OF DISCHARGE, QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-width of 18 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 1	2	3	4	5	6	7
2·0	V	2·605	4·105	5·229	6·137	6·911	7·595	8·208
	Q	49·49	164·2	329·4	540·0	794·8	1093·7	1436·4
	C	0·610	0·706	0·758	0·792	0·817	0·837	0·853
1·5	V	2·256	3·555	4·527	5·314	5·986	6·577	7·109
	Q	42·86	142·2	285·2	467·6	688·4	947·1	1244·0
	C	0·610	0·706	0·758	0·792	0·817	0·837	0·853
1·0	V	1·842	2·903	3·697	4·339	4·887	5·370	5·804
	Q	35·00	116·1	232·9	381·8	562·0	773·3	1015·7
	C	0·610	0·706	0·758	0·792	0·817	0·837	0·853
0·8	V	1·645	2·593	3·306	3·881	4·371	4·803	5·191
	Q	31·25	103·7	208·3	341·5	502·7	691·6	908·4
	C	0·609	0·705	0·758	0·792	0·817	0·837	0·853
0·6	V	1·417	2·239	2·860	3·361	3·785	4·165	4·541
	Q	26·92	89·56	180·2	295·8	435·3	599·8	794·7
	C	0·606	0·703	0·757	0·792	0·817	0·838	0·854
0·4	V	1·150	1·821	2·329	2·741	3·094	3·409	3·683
	Q	21·85	72·84	146·7	241·2	355·8	490·9	644·5
	C	0·602	0·700	0·755	0·791	0·818	0·840	0·856
0·3	V	·9891	1·570	2·015	2·374	2·680	2·955	3·194
	Q	18·79	62·80	126·9	208·9	308·2	425·5	559·0
	C	0·598	0·697	0·754	0·791	0·818	0·841	0·857
0·2	V	·7965	1·274	1·638	1·936	2·191	2·416	2·617
	Q	15·13	50·96	103·2	170·4	251·9	347·9	453·0
	C	0·590	0·693	0·751	0·790	0·819	0·842	0·860
0·1	V	·5424	·8853	0·149	1·366	1·553	1·718	1·868
	Q	10·30	35·41	72·39	120·2	178·6	247·4	326·9
	C	0·568	0·681	0·745	0·788	0·821	0·847	0·868
0·05	V	·3645	·6090	·8011	·9616	1·102	1·227	1·341
	Q	6·925	24·36	50·46	84·62	126·7	176·7	234·7
	C	0·540	0·662	0·735	0·785	0·824	0·855	0·881

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

For a Bed-width of 20 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 1	2	3	4	5	6	7
2·0	V	2·625	4·147	5·296	6·226	7·034	7·717	8·342
	Q	55·12	182·5	365·4	597·7	879·2	1203·8	1576·6
	C	0·612	0·708	0·761	0·795	0·822	0·840	0·856
1·5	V	2·273	3·590	4·586	5·392	6·091	6·683	7·224
	Q	47·73	158·0	316·4	517·6	761·4	1042·5	1365·3
	C	0·612	0·708	0·761	0·795	0·822	0·840	0·856
1·0	V	1·856	2·932	3·745	4·402	4·974	5·457	5·899
	Q	38·98	129·0	258·4	422·6	621·7	851·3	1114·9
	C	0·612	0·708	0·761	0·795	0·822	0·840	0·856
0·8	V	1·658	2·619	3·350	3·938	4·449	4·880	5·276
	Q	34·82	115·2	231·1	378·0	556·1	761·3	997·2
	C	0·611	0·707	0·761	0·795	0·822	0·840	0·856
0·6	V	1·428	2·262	2·897	3·410	3·857	4·232	4·574
	Q	29·99	99·53	199·9	327·4	482·1	660·2	864·5
	C	0·608	0·705	0·760	0·795	0·823	0·841	0·857
0·4	V	1·158	1·838	2·360	2·780	3·153	3·464	3·743
	Q	24·32	80·87	162·8	266·9	394·1	540·4	707·4
	C	0·604	0·702	0·758	0·794	0·824	0·843	0·859
0·3	V	·9966	1·585	2·040	2·408	2·734	3·003	3·246
	Q	20·93	69·74	140·8	231·2	341·7	4·685	613·5
	C	0·600	0·699	0·757	0·794	0·825	0·844	0·860
0·2	V	·8033	1·287	1·659	1·967	2·235	2·458	2·660
	Q	16·87	56·63	114·5	188·8	279·4	383·4	502·7
	C	0·592	0·695	0·754	0·794	0·826	0·846	0·863
0·1	V	·5466	·8947	1·164	1·388	1·585	1·749	1·900
	Q	11·48	39·37	80·32	133·2	198·1	272·8	359·1
	C	0·570	0·683	0·748	0·793	0·828	0·851	0·872
0·05	V	·3673	·6158	·8129	·9780	1·126	1·250	1·367
	Q	7·713	27·09	56·09	93·89	140·7	195·0	258·4
	C	0·541	0·665	0·739	0·790	0·832	0·861	0·887

and cubic feet per second.

TABLE IX.

MEAN VELOCITIES (V) OF DISCHARGE, QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-width of 25 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 2	3	4	5	6	7	8
1·0	V	2·987	3·837	4·526	5·119	5·632	6·102	6·528
	Q	161·3	322·3	525·0	767·8	1047·5	1366·8	1723·3
	C	0·712	0·766	0·801	0·827	0·846	0·863	0·877
0·8	V	2·669	3·432	4·048	4·578	5·037	5·465	5·846
	Q	144·1	288·3	469·6	686·7	236·9	1224·2	1543·3
	C	0·711	0·766	0·801	0·827	0·846	0·864	0·878
0·6	V	2·308	2·967	3·506	3·969	4·368	4·738	5·068
	Q	124·6	249·2	406·7	595·3	812·4	1061·3	1337·9
	C	0·710	0·765	0·801	0·828	0·847	0·865	0·879
0·5	V	2·104	2·706	3·201	3·628	3·991	4·330	4·632
	Q	113·6	227·3	371·3	544·2	742·3	969·9	1222·8
	C	0·709	0·764	0·801	0·829	0·848	0·866	0·880
0·4	V	1·876	242·0	2·863	3·245	3·574	3·878	4·148
	Q	101·3	203·3	332·1	486·7	664·8	868·7	1095·1
	C	0·707	0·764	0·801	0·829	0·849	0·867	0·881
0·3	V	1·621	2·094	2·479	2·814	3·099	3·366	3·604
	Q	87·53	175·9	287·6	422·1	576·4	754·0	951·4
	C	0·705	0·763	0·801	0·830	0·850	0·869	0·884
0·2	V	1·314	1·702	2·024	2·300	2·539	2·760	2·959
	Q	70·96	143·0	234·8	345·0	472·2	618·2	781·2
	C	0·700	0·760	0·801	0·831	0·853	0·873	0·889
0·15	V	1·132	1·470	1·753	1·994	2·208	2·399	2·574
	Q	61·13	123·5	203·3	299·1	410·7	537·4	679·5
	C	0·696	0·758	0·801	0·832	0·856	0·876	0·893
0·1	V	·9130	1·196	1·430	1·635	1·810	1·974	2·121
	Q	49·30	100·5	165·8	245·2	336·7	442·2	559·9
	C	0·688	0·755	0·800	0·835	0·860	0·883	0·901
0·05	V	·6301	·8355	1·010	1·161	1·297	1·421	1·533
	Q	34·02	70·18	117·2	174·1	241·2	318·3	404·7
	C	0·671	0·746	0·799	0·839	0·871	0·899	0·921

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

For a Bed-width of 30 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 2	3	4	5	6	7	8
1·0	V	3·029	3·905	4·618	5·239	5·778	6·260	6·703
	Q	193·8	386·6	628·0	916·8	1248·0	1621·3	2037·9
	C	0·715	0·770	0·805	0·832	0·852	0·868	0·882
0·8	V	2·798	3·493	4·130	4·686	5·168	5·605	6·002
	Q	179·1	345·8	551·7	820·0	1116·3	1452·7	1824·6
	C	0·714	0·770	0·805	0·832	0·852	0·869	0·883
0·6	V	2·340	3·013	3·577	3·977	4·481	4·860	5·204
	Q	149·8	298·3	486·5	696·0	967·9	1258·7	1582·0
	C	0·713	0·769	0·805	0·833	0·853	0·870	0·884
0·5	V	2·133	2·755	3·265	3·709	4·095	4·441	4·756
	Q	136·5	272·7	444·0	649·1	884·5	1150·2	1445·8
	C	0·712	0·768	0·805	0·833	0·854	0·871	0·885
0·4	V	1·967	2·464	2·920	3·321	3·667	3·977	4·264
	Q	125·9	243·0	397·1	581·2	792·1	1030·0	1296·2
	C	0·710	0·768	0·805	0·834	0·855	0·872	0·887
0·3	V	1·642	2·131	2·529	2·817	3·183	3·452	3·705
	Q	105·1	211·0	343·9	493·0	687·5	894·1	1126·3
	C	0·708	0·767	0·805	0·835	0·857	0·874	0·890
0·2	V	1·378	1·733	2·066	2·354	2·608	2·831	3·042
	Q	88·19	171·6	281·0	411·9	563·3	733·2	924·8
	C	0·703	0·764	0·805	0·836	0·860	0·878	0·895
0·15	V	1·147	1·497	1·789	1·998	2·267	2·463	2·647
	Q	73·41	148·2	243·3	349·6	489·7	637·9	804·7
	C	0·699	0·762	0·805	0·837	0·863	0·882	0·899
0·1	V	·9591	1·217	1·460	1·674	1·862	2·028	2·185
	Q	61·38	120·5	198·6	292·9	402·2	525·2	664·3
	C	0·692	0·759	0·805	0·841	0·868	0·889	0·909
0·05	V	·6615	·8535	1·034	1·192	1·335	1·463	1·583
	Q	42·34	84·50	140·6	208·6	288·4	378·9	481·2
	C	0·675	0·752	0·806	0·847	0·880	0·907	0·931

and cubic feet per second.

TABLE IX.

MEAN VELOCITIES (V) OF DISCHARGE, QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-width of 35 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 2	3	4	5	6	7	8
1·0	V	3·061	3·953	4·695	5·327	5·889	6·395	6·844
	Q	226·5	450·6	732·4	1065·4	1448·7	1880·1	2354·3
	C	0·718	0·772	0·809	0·835	0·856	0·873	0·886
0·8	V	2·736	3·536	4·200	4·765	5·267	5·726	6·129
	Q	202·5	403·1	655·2	953·0	1295·7	1683·4	2108·4
	C	0·717	0·772	0·809	0·835	0·856	0·874	0·887
0·6	V	2·366	3·058	3·636	4·131	4·567	4·965	5·320
	Q	175·1	348·6	567·2	826·2	1123·5	1459·7	1830·1
	C	0·716	0·771	0·809	0·836	0·857	0·875	0·889
0·5	V	2·157	2·792	3·320	3·776	4·174	4·537	4·862
	Q	159·6	318·3	517·9	755·2	1027·8	1333·9	1672·5
	C	0·715	0·771	0·809	0·837	0·858	0·876	0·890
0·4	V	1·924	2·497	2·970	3·381	3·737	4·062	4·358
	Q	142·4	284·6	463·3	676·2	919·3	1194·2	1499·1
	C	0·713	0·771	0·809	0·838	0·859	0·877	0·892
0·3	V	1·662	2·160	2·571	2·931	3·240	3·526	3·787
	Q	123·0	246·2	401·1	586·2	797·0	1036·6	1302·7
	C	0·711	0·710	0·809	0·839	0·860	0·879	0·895
0·2	V	1·347	1·756	2·100	2·396	2·655	2·896	3·109
	Q	99·68	200·2	327·6	479·2	653·1	851·4	1069·5
	C	0·706	0·767	0·809	0·840	0·863	0·884	0·900
0·15	V	1·160	1·517	1·819	2·078	2·310	2·519	2·708
	Q	85·84	172·9	283·8	415·6	568·3	740·6	931·5
	C	0·702	0·765	0·809	0·841	0·867	0·888	0·905
0·1	V	·9375	1·234	1·487	1·705	1·897	2·073	2·235
	Q	69·37	140·7	232·0	341·0	466·7	609·5	768·8
	C	0·695	0·762	0·810	0·845	0·872	0·895	0·915
0·05	V	·6468	·8656	1·053	1·217	1·363	1·497	1·622
	Q	47·86	98·68	164·3	243·4	335·4	440·1	558·0
	C	0·678	0·756	0·811	0·853	0·886	0·914	0·939

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

For a Bed-width of 40 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 2	3	4	5	6	7	8
1·0	V	3·084	3·997	4·750	5·402	5·979	6·497	6·969
	Q	259·0	515·6	836·0	1377·5	1650·2	2137·5	2676·1
	C	0·719	0·775	0·811	0·838	0·859	0·876	0·890
0·8	V	2·755	3·576	4·249	4·831	5·347	5·818	6·240
	Q	231·4	461·3	747·8	1231·9	1475·8	1914·1	2396·2
	C	0·718	0·775	0·811	0·838	0·859	0·877	0·891
0·6	V	2·382	3·093	3·680	4·189	4·636	5·044	5·416
	Q	200·1	399·0	647·7	1068·2	1279·5	1659·4	2079·7
	C	0·717	0·774	0·811	0·839	0·860	0·878	0·893
0·5	V	2·172	2·823	3·359	3·829	4·237	4·610	4·950
	Q	182·4	364·2	591·2	976·4	1169·4	1516·7	1900·8
	C	0·716	0·774	0·811	0·840	0·861	0·879	0·894
0·4	V	1·937	2·525	3·004	3·429	3·794	4·128	4·438
	Q	162·7	325·7	528·7	874·4	1047·1	1358·1	1704·2
	C	0·714	0·774	0·811	0·841	0·862	0·880	0·896
0·3	V	1·672	2·184	2·602	2·973	3·290	3·587	3·847
	Q	140·4	281·7	457·9	758·1	908·0	1180·1	1477·2
	C	0·712	0·773	0·811	0·842	0·863	0·883	0·898
0·2	V	1·359	1·776	2·127	2·430	2·699	2·945	3·166
	Q	114·1	229·1	374·3	619·6	744·9	968·9	1215·7
	C	0·708	0·770	0·812	0·843	0·867	0·888	0·904
0·15	V	1·170	1·534	1·842	2·110	2·345	2·562	2·757
	Q	98·28	197·9	324·2	538·0	647·2	842·9	1058·7
	C	0·704	0·768	0·812	0·845	0·870	0·892	0·909
0·10	V	·9459	1·248	1·506	1·729	1·930	2·111	2·279
	Q	79·45	161·0	265·0	440·9	532·7	694·5	875·1
	C	0·697	0·765	0·813	0·848	0·877	0·900	0·920
0·05	V	·6528	·8759	1·068	1·236	1·389	1·526	1·655
	Q	54·83	113·0	188·0	315·2	383·4	502·0	635·5
	C	0·680	0·759	0·815	0·857	0·892	0·920	0·945

and cubic feet per second

TABLE IX.

Mean Velocities (V) of Discharge, Quantities dis-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-

N=0·0225.

S per thousand.		Depths of water in feet. 2·	2·5	3·	3·5	4·	4·5	5·
0·8	V	2·787	3·230	3·624	3·991	4·326	4·642	4·937
	Q	289·8	423·9	576·2	747·3	934·4	1138·4	1357·7
	C	0·721	0·753	0·777	0·798	0·815	0·830	0·843
0·6	V	2·410	2·794	3·138	3·456	3·747	4·025	4·280
	Q	250·6	366·7	498·9	647·1	809·3	987·1	1177·0
	C	0·720	0·752	0·777	0·798	0·815	0·831	0·844
0·5	V	2·197	2·547	2·861	3·154	3·425	3·675	3·908
	Q	228·5	334·3	454·9	590·6	739·8	901·3	1074·7
	C	0·719	0·751	0·776	0·798	0·816	0·831	0·844
0·4	V	1·959	2·275	2·559	2·818	3·063	3·290	3·499
	Q	203·7	298·6	406·9	527·7	661·6	906·9	962·2
	C	0·717	0·750	0·776	0·797	0·816	0·832	0·845
0·3	V	1·692	1·968	2·213	2·440	2·656	2·853	3·034
	Q	176·0	258·3	351·9	456·9	573·7	699·7	834·3
	C	0·715	0·749	0·775	0·797	0·817	0·833	0·846
0·25	V	1·543	1·794	2·018	2·228	2·425	2·604	2·773
	Q	160·5	235·5	320·9	417·2	523·8	638·6	762·6
	C	0·714	0·748	0·774	0·797	0·817	0·833	0·847
0·2	V	1·374	1·600	1·803	1·992	2·168	2·333	2·483
	Q	142·9	210·0	286·7	373·0	468·3	572·2	682·8
	C	0·711	0·746	0·773	0·797	0·817	0·834	0·848
0·15	V	1·183	1·380	1·559	1·724	1·880	2·022	2·156
	Q	123·0	181·1	247·9	322·8	406·1	495·9	592·9
	C	0·707	0·743	0·772	0·796	0·818	0·835	0·850
0·1	V	·9555	1·119	1·268	1·407	1·535	1·659	1·771
	Q	99·37	146·9	201·6	263·5	331·6	406·9	487·0
	C	0·699	0·738	0·769	0·796	0·818	0·839	0·855
0·05	V	·6605	·7811	·8896	·9925	1·088	1·181	1·265
	Q	68·69	102·5	141·4	185·8	235·0	289·6	347·9
	C	0·683	0·728	0·763	0·794	0·820	0·844	0·864

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

width of 50 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 5·5	6·	6·5	7·	7·5	8·0	9·0
0·8	V	5·212						
	Q	1590·9						
	C	0·854						
0·6	V	4·519	4·745	4·967				
	Q	1379·4	1594·3	1824·1				
	C	0·855	0·865	0·875				
0·5	V	4·130	4·338	4·540	4·726	4·909		
	Q	1260·7	1457·6	1667·3	1885·7	2117·0		
	C	0·856	0·866	0·876	0·884	0·892		
0·4	V	3·698	3·884	4·065	4·237	4·399	4·554	4·850
	Q	1128·8	1305·0	1492·9	1690·6	1897·1	2113·0	2575·3
	C	0·857	0·867	0·877	0·886	0·894	0·901	0·914
0·3	V	3·207	3·371	3·524	3·677	3·820	3·958	4·218
	Q	978·9	1132·6	1294·2	1467·1	1647·4	1836·5	2239·7
	C	0·858	0·869	0·879	0·888	0·896	0·904	0·918
0·25	V	2·931	3·081	3·229	3·364	3·494	3·621	3·863
	Q	894·7	1035·2	1185·8	1342·2	1506·8	1680·1	2051·2
	C	0·859	0·870	0·881	0·890	0·898	0·906	0·921
0·2	V	2·628	2·766	2·898	3·019	3·140	3·253	3·471
	Q	802·2	929·4	1064·3	1204·6	1354·1	1509·4	1843·1
	C	0·861	0·873	0·884	0·893	0·902	0·910	0·925
0·15	V	2·283	2·403	2·521	2·629	2·734	2·833	3·028
	Q	696·9	807·4	925·8	1049·0	1179·0	1314·5	1607·9
	C	0·864	0·876	0·888	0·898	0·907	0·915	0·932
0·1	V	1·877	1·978	2·077	2·169	2·257	2·343	2·504
	Q	572·9	664·6	762·8	865·4	973·3	1087·1	1329·6
	C	0·870	0·883	0·896	0·907	0·917	0·927	0·944
0·05	V	1·347	1·424	1·500	1·569	1·638	1·704	1·827
	Q	411·2	478·5	550·9	626·0	706·4	790·6	970·1
	C	0·883	0·899	0·915	0·928	0·941	0·953	0·974

and cubic feet per second.

TABLE IX.

MEAN VELOCITIES (V) OF DISCHARGE, QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-width of 60 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 2·	2·5	3·	3·5	4·	4·5	5·
0·8	V	2·810	3·259	3·665	4·035	4·384	4·706	5·010
	Q	348·4	509·2	692·7	896·8	1122·3	1365·9	1628·2
	C	0·723	0·755	0·780	0·800	0·818	0·833	0·846
0·6	V	2·430	2·812	3·174	3·494	3·796	4·077	4·339
	Q	301·3	439·4	599·9	776·5	971·8	1183·3	1410·2
	C	0·722	0·754	0·780	0·800	0·818	0·833	0·846
0·5	V	2·216	2·570	2·894	3·190	3·466	3·721	3·966
	Q	274·8	401·6	547·0	709·0	887·3	1080·0	1288·9
	C	0·721	0·753	0·779	0·800	0·818	0·833	0·847
0·4	V	2·003	2·296	2·589	2·854	3·099	3·332	3·551
	Q	248·4	358·7	489·3	634·3	793·3	967·1	1154·1
	C	0·719	0·752	0·779	0·800	0·818	0·834	0·848
0·3	V	1·730	1·986	2·238	2·471	2·688	2·889	3·078
	Q	214·5	310·3	423·0	549·2	688·1	838·5	1000·3
	C	0·717	0·751	0·778	0·800	0·819	0·835	0·849
0·25	V	1·577	1·810	2·041	2·256	2·454	2·641	2·814
	Q	195·5	282·8	385·7	501·4	628·2	766·5	914·5
	C	0·716	0·750	0·777	0·800	0·819	0·836	0·850
0·2	V	1·405	1·615	1·824	2·018	2·198	2·354	2·523
	Q	174·2	252·3	344·7	448·5	562·7	683·2	820·0
	C	0·713	0·748	0·776	0·800	0·820	0·837	0·852
0·15	V	1·193	1·389	1·577	1·747	1·905	2·050	2·190
	Q	147·9	217·0	298·0	388·3	487·7	595·0	711·7
	C	0·709	0·745	0·775	0·800	0·821	0·838	0·854
0·1	V	·9645	1·131	1·285	1·425	1·558	1·680	1·799
	Q	119·6	176·7	242·9	316·7	398·8	487·6	584·7
	C	0·702	0·741	0·773	0·799	0·822	0·841	0·859
0·05	V	·6668	·7884	·9012	1·006	1·105	1·198	1·287
	Q	82·68	123·2	170·3	223·6	282·9	347·7	418·3
	C	0·686	0·730	0·767	0·798	0·825	0·848	0·869

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

Section, with Side Slopes of One to One.

For a Bed-width of 60 feet.

N=0·0225.

S per thousand.		5·5	6·	6·5	7·	7·5	8·	9·
		Depths of water in feet.						
0·8	V	5·299						
	Q	1909·0						
	C	0·858						
0·6	V	4·595	4·823	5·050				
	Q	1655·3	1909·9	2182·9				
	C	0·859	0·869	0·878				
0·5	V	4·199	4·413	4·616	4·814	5·002		
	Q	1512·7	1747·5	1995·3	2257·8	2532·3		
	C	0·860	0·870	0·879	0·888	0·896		
0·4	V	3·760	3·952	4·138	4·310	4·485	4·639	4·954
	Q	1354·5	1565·0	1788·6	2021·4	2270·5	2528·6	3076·4
	C	0·861	0·871	0·881	0·889	0·898	0·905	0·919
0·3	V	3·260	3·430	3·591	3·745	3·896	4·035	4·309
	Q	1174·4	1358·3	1552·2	1756·4	1972·3	2195·0	2675·9
	C	0·862	0·873	0·883	0·892	0·901	0·908	0·923
0·25	V	2·980	3·139	3·286	3·427	3·564	3·696	3·947
	Q	1073·5	1243·0	1420·4	1607·3	1804·3	2010·6	2451·1
	C	0·863	0·875	0·885	0·894	0·903	0·911	0·926
0·2	V	2·671	2·813	2·949	3·075	3·203	3·320	3·545
	Q	962·2	1113·9	1274·7	1442·2	1621·5	1806·1	2201·4
	C	0·865	0·877	0·888	0·897	0·907	0·915	0·930
0·15	V	2·322	2·447	2·565	2·678	2·789	2·895	3·094
	Q	836·5	969·0	1108·7	1256·0	1411·9	1574·9	1921·4
	C	0·868	0·881	0·892	0·902	0·912	0·921	0·937
0·10	V	1·909	2·015	2·116	2·211	2·305	2·389	2·562
	Q	687·7	797·9	914·6	1036·9	1166·9	1299·6	1591·0
	C	0·874	0·888	0·901	0·912	0·923	0·931	0·950
0·05	V	1·371	1·452	1·530	1·599	1·674	1·739	1·872
	Q	493·9	575·0	661·3	749·9	847·5	946·0	1162·5
	C	0·888	0·905	0·920	0·933	0·948	0·958	0·982

and cubic feet per second.

TABLE IX.

Mean Velocities (V) of Discharge, Quantities dis-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-

N=0·0225.

S per thousand.		Depths of water in feet. 2·	2·5	3·	3·5	4·	4·5	5·
0·8	V	2·825	3·279	3·689	4·070	4·425	4·754	5·063
	Q	406·8	594·3	807·9	1047·0	1309·8	1593·8	1898·6
	C	0·724	0·756	0·781	0·802	0·820	0·835	0·848
0·6	V	2·443	2·836	3·195	3·525	3·832	4·117	4·385
	Q	351·8	514·0	699·7	906·8	1134·3	1380·2	1644·4
	C	0·723	0·755	0·781	0·802	0·820	0·835	0·848
0·5	V	2·227	2·585	2·917	3·218	3·498	3·763	4·008
	Q	320·7	468·5	638·8	827·8	1035·4	1261·5	1503·0
	C	0·722	0·754	0·781	0·802	0·820	0·836	0·849
0·4	V	1·986	2·309	2·609	2·822	3·129	3·366	3·589
	Q	286·0	418·5	571·4	725·9	926·2	1128·4	1345·8
	C	0·720	0·753	0·781	0·802	0·820	0·836	0·850
0·3	V	1·715	1·996	2·256	2·493	2·713	2·919	3·112
	Q	247·0	361·8	494·1	641·3	803·0	978·6	1167·0
	C	0·718	0·752	0·780	0·802	0·821	0·837	0·851
0·25	V	1·564	1·821	2·057	2·275	2·477	2·667	2·845
	Q	225·2	330·0	450·5	585·2	733·2	894·1	1066·9
	C	0·717	0·751	0·779	0·802	0·821	0·838	0·852
0·2	V	1·393	1·624	1·838	2·035	2·218	2·389	2·550
	Q	200·6	294·3	402·5	523·5	656·5	800·9	956·2
	C	0·714	0·749	0·778	0·802	0·822	0·839	0·854
0·15	V	1·200	1·403	1·590	1·763	1·923	2·074	2·216
	Q	172·8	254·3	348·2	453·5	569·2	695·3	831·0
	C	0·710	0·747	0·777	0·802	0·823	0·841	0·857
0·1	V	·9701	1·140	1·295	1·411	1·572	1·699	1·820
	Q	139·7	206·6	283·6	363·0	465·3	569·6	682·5
	C	0·703	0·743	0·775	0·802	0·824	0·844	0·862
0·05	V	·6705	·8051	·9082	1·016	1·117	1·213	1·303
	Q	96·53	145·9	198·9	261·4	330·6	406·6	488·6
	C	0·687	0·732	0·769	0·801	0·828	0·852	0·873

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

width of 70 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 5·5	6·	6·5	7·	7·5	8·	9·
0·8	V	5·359						
	Q	2225·3						
	C	0·860						
0·6	V	4·646	4·885					
	Q	1929·2	2227·6					
	C	0·861	0·871					
0·5	V	4·246	4·455	4·678	4·881			
	Q	1763·1	2031·5	2326·1	2630·8			
	C	0·862	0·872	0·882	0·891			
0·4	V	3·802	3·997	4·193	4·376	4·549	4·712	
	Q	1578·8	1822·6	2085·0	2358·7	2644·1	2940·3	
	C	0·863	0·873	0·884	0·893	0·901	0·908	
0·3	V	3·300	3·470	3·640	3·798	3·953	4·095	3·382
	Q	1370·3	1582·3	1810·0	2047·1	2297·7	2555·3	3115·6
	C	0·865	0·875	0·886	0·895	0·904	0·911	0·927
0·25	V	3·017	3·176	3·331	3·474	3·617	3·751	4·013
	Q	1253·8	1448·2	1656·3	1872·5	2102·4	2340·6	2853·2
	C	0·866	0·877	0·888	0·897	0·906	0·914	0·930
0·2	V	2·705	2·849	2·988	3·121	3·249	3·369	3·604
	Q	1123·2	1299·1	1485·8	1682·2	1888·5	2102·2	2562·4
	C	0·868	0·880	0·891	0·901	0·910	0·918	0·934
0·15	V	2·350	2·480	2·600	2·718	2·829	2·940	3·148
	Q	975·8	1130·9	1292·8	1465·0	1644·3	2090·3	2238·2
	C	0·871	0·884	0·895	0·906	0·915	0·925	0·942
0·10	V	1·932	2·040	2·144	2·244	2·338	2·429	2·606
	Q	802·3	930·2	1066·1	1209·5	1359·0	1834·6	1852·8
	C	0·877	0·891	0·904	0·916	0·926	0·936	0·955
0·05	V	1·390	1·470	1·551	1·626	1·701	1·769	1·909
	Q	577·2	670·3	771·2	876·4	988·7	1104·8	1357·3
	C	0·892	0·908	0·925	0·939	0·953	0·964	0·989

and cubic feet per second.

TABLE IX.

MEAN VELOCITIES (V) OF DISCHARGE, QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-

N=0·0225.

S per thousand.		Depths of water in feet. 2·	2·5	3·	3·5	4·	4·5	5·
0·8	V	2·838	3·295	3·714	4·100	4·455	4·794	5·108
	Q	465·4	679·6	924·8	1198·2	1496·9	1822·9	2170·9
	C	0·725	0·757	0·783	0·804	0·821	0·837	0·850
0·6	V	2·454	2·850	3·213	1·551	3·858	4·152	4·423
	Q	402·4	587·8	800·0	1037·8	1296·3	1578·8	1879·8
	C	0·724	0·756	0·782	0·804	0·821	0·837	0·850
0·5	V	2·238	2·599	2·933	3·242	3·522	3·795	4·043
	Q	367·0	536·0	730·3	947·5	1183·4	1443·0	1718·3
	C	0·723	0·755	0·782	0·804	0·821	0·838	0·851
0·4	V	1·996	2·321	2·624	2·899	3·154	3·394	3·620
	Q	327·3	478·7	653·4	847·2	1059·8	1290·6	1538·5
	C	0·721	0·754	0·782	0·804	0·822	0·838	0·852
0·3	V	1·723	2·007	2·269	2·511	2·735	2·942	3·143
	Q	282·6	413·9	565·0	733·8	918·9	1118·7	1335·8
	C	0·719	0·753	0·781	0·804	0·823	0·839	0·854
0·25	V	1·572	1·830	2·071	2·289	2·496	2·690	2·872
	Q	257·8	377·4	515·7	669·0	838·6	1022·9	1220·6
	C	0·718	0·752	0·781	0·803	0·823	0·840	0·855
0·2	V	1·399	1·633	1·850	2·048	2·235	2·409	2·575
	Q	229·4	336·8	460·6	598·5	751·0	916·0	1094·4
	C	0·715	0·750	0·780	0·803	0·824	0·841	0·857
0·15	V	1·205	1·410	1·601	1·774	1·939	2·091	2·235
	Q	197·6	290·8	398·6	518·4	651·5	795·1	949·9
	C	0·711	0·748	0·779	0·803	0·825	0·843	0·859
0·1	V	·9743	1·145	1·302	1·448	1·585	1·713	1·836
	Q	159·8	236·1	324·2	423·2	532·6	651·4	780·3
	C	0·704	0·744	0·776	0·803	0·826	0·846	0·864
0·05	V	·6735	·7993	·9144	1·024	1·126	1·223	1·317
	Q	110·4	164·8	227·7	299·3	378·3	465·0	559·7
	C	0·688	0·734	0·771	0·803	0·830	0·854	0·876

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

width of 80 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 5·5	6·	6·5	7·	7·5	8·	9·
0·8	V	5·408						
	Q	2543·1						
	C	0·862						
0·6	V	4·689	4·932					
	Q	2205·0	2544·9					
	C	0·863	0·873					
0·5	V	4·285	4·508	4·726	4·933			
	Q	2015·0	2326·1	2657·2	3004·4			
	C	0·864	0·874	0·884	0·893			
0·4	V	3·838	4·036	4·236	4·421	4·599	4·772	
	Q	1804·8	2082·6	2381·7	2692·4	3018·1	3359·5	
	C	0·865	0·875	0·886	0·895	0·903	0·911	
0·3	V	3·331	3·504	3·677	3·842	4·000	4·147	4·429
	Q	1566·4	1808·1	2067·4	2339·8	2625·0	2919·5	3547·6
	C	0·867	0·877	0·888	0·898	0·907	0·914	0·928
0·25	V	3·045	3·206	3·364	3·515	3·660	3·797	4·056
	Q	1431·9	1654·3	1891·4	2140·6	2401·9	2673·1	3248·8
	C	0·868	0·879	0·890	0·900	0·909	0·917	0·931
0·2	V	2·729	2·877	3·019	3·154	3·288	3·411	3·647
	Q	1283·3	1484·5	1697·4	1920·8	2157·7	2401·3	2921·2
	C	0·870	0·882	0·893	0·903	0·913	0·921	0·936
0·15	V	2·375	2·503	2·628	2·750	2·866	2·977	3·183
	Q	1116·8	1291·5	1477·6	1674·7	1880·8	2095·8	2549·6
	C	0·874	0·886	0·898	0·909	0·919	0·928	0·943
0·10	V	1·953	2·062	2·169	2·270	2·369	2·459	2·637
	Q	918·4	1064·0	1219·5	1382·4	1554·6	1731·1	2112·2
	C	0·880	0·894	0·907	0·919	0·930	0·939	0·957
0·05	V	1·404	1·487	1·569	1·647	1·723	1·794	1·931
	Q	660·2	767·3	882·2	1003·0	1130·7	1262·9	1546·7
	C	0·895	0·912	0·928	0·943	0·957	0·969	0·991

and cubic feet per second.

TABLE IX.

MEAN VELOCITIES (V) OF DISCHARGE, QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-

N=0·0225.

S per thousand.		Depths of water in feet. 2·	2·5	3·	3·5	4·	4·5	5·
0·8	V	2·843	3·309	3·727	4·116	4·484	4·822	5·141
	Q	523·1	765·2	1039·8	1347·0	1685·9	2050·5	2442·0
	C	0·725	0·758	0·783	0·804	0·823	0·838	0·851
0·6	V	2·459	2·861	3·228	3·564	3·884	4·176	4·452
	Q	452·4	661·6	900·6	1166·3	1460·4	1775·8	2114·7
	C	0·724	0·757	0·783	0·804	0·823	0·838	0·851
0·5	V	2·242	2·609	2·946	3·254	3·545	3·817	4·069
	Q	412·5	603·3	821·9	1064·9	1332·9	1623·2	1932·8
	C	0·723	0·756	0·783	0·804	0·823	0·839	0·852
0·4	V	1·999	2·331	2·632	2·910	3·173	3·414	3·644
	Q	367·8	539·0	734·3	952·3	1193·0	1451·8	1730·9
	C	0·721	0·755	0·782	0·804	0·823	0·839	0·853
0·3	V	1·729	2·015	2·277	2·520	2·749	2·964	3·163
	Q	318·1	466·0	635·3	824·7	1033·6	1260·4	1502·4
	C	0·720	0·754	0·781	0·804	0·824	0·841	0·855
0·25	V	1·574	1·837	2·078	2·301	2·510	2·709	2·891
	Q	289·6	424·8	579·8	753·0	943·8	1152·0	1373·2
	C	0·718	0·753	0·781	0·804	0·824	0·842	0·856
0·2	V	1·402	1·639	1·859	2·058	2·248	2·425	2·592
	Q	258·0	379·0	518·7	673·5	845·2	1031·2	1231·2
	C	0·715	0·751	0·781	0·804	0·825	0·843	0·858
0·15	V	1·208	1·416	1·608	1·782	1·949	2·106	2·252
	Q	222·3	327·4	448·6	583·1	732·8	895·6	1069·7
	C	0·711	0·749	0·780	0·804	0·826	0·845	0·861
0·10	V	·9778	1·150	1·308	1·455	1·595	1·726	1·850
	Q	179·9	265·9	364·9	476·1	599·7	734·0	878·7
	C	0·705	0·745	0·777	0·804	0·828	0·848	0·866
0·05	V	·6752	·8026	·9199	1·029	1·134	1·233	1·326
	Q	124·2	185·6	256·6	336·7	426·4	524·3	629·8
	C	0·689	0·735	0·773	0·804	0·832	0·857	0·878

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

width of 90 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 5·5	6·	6·5	7·	7·5	8·	9·
0·8	V	5·445						
	Q	2860·0						
	C	0·863						
0·6	V	4·721	4·979					
	Q	2499·7	2867·9					
	C	0·864	0·875					
0·5	V	4·315	4·551	4·767	4·977			
	Q	2266·4	2621·4	2990·1	3379·4			
	C	0·865	0·876	0·886	0·895			
0·4	V	3·863	4·074	4·273	4·462	4·641	4·817	
	Q	2029·0	2346·6	2680·2	3029·7	3393·7	3776·5	
	C	0·866	0·877	0·888	0·897	0·905	0·913	
0·3	V	3·354	3·537	3·713	3·876	4·032	4·185	4·479
	Q	1761·7	2037·3	2329·0	2631·8	2948·4	3281·0	3990·8
	C	0·868	0·879	0·891	0·900	0·908	0·916	0·931
0·25	V	3·068	3·237	3·397	3·547	3·694	3·833	4·102
	Q	1611·5	1864·5	2130·8	2408·4	2701·2	3005·1	3654·9
	C	0·870	0·881	0·893	0·902	0·911	0·919	0·934
0·2	V	2·751	2·904	3·049	3·186	3·318	3·444	3·684
	Q	1445·0	1672·7	1912·5	2163·3	2426·3	2700·1	3282·4
	C	0·872	0·884	0·896	0·906	0·915	0·923	0·938
0·15	V	2·393	2·529	2·654	2·774	2·893	3·005	3·219
	Q	1256·9	1456·7	1664·7	1883·5	2115·5	2355·9	2868·1
	C	0·876	0·889	0·901	0·911	0·921	0·930	0·946
0·10	V	1·968	2·084	2·187	2·290	2·387	2·485	2·667
	Q	1033·7	1200·4	1371·8	1554·9	1745·5	1948·2	2376·3
	C	0·882	0·897	0·909	0·921	0·931	0·942	0·960
0·05	V	1·417	1·505	1·584	1·664	1·737	1·814	1·954
	Q	744·3	866·9	993·6	1129·8	1270·2	1422·2	1741·0
	C	0·898	0·916	0·931	0·946	0·958	0·972	0·995

and cubic feet per second.

TABLE IX.

MEAN VELOCITIES (V) OF DISCHARGE, QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-

N=0·0225.

S per thousand.		Depths of water in feet. 2·	3·	3·5	4·	4·5	5·	5·5
0·5	V	2·246	2·955	3·268	3·558	3·832	4·096	4·339
	Q	458·2	913·1	1183·8	1480·1	1802·0	2150·4	2517·7
	C	0·723	0·783	0·805	0·823	0·839	0·854	0·866
0·45	V	2·131	2·803	3·100	3·379	3·634	3·886	4·116
	Q	434·7	866·1	1123·0	1405·7	1708·9	2040·1	2388·3
	C	0·723	0·783	0·805	0·824	0·839	0·854	0·866
0·4	V	2·006	2·639	2·923	3·185	3·431	3·668	3·885
	Q	409·2	815·4	1058·8	1325·0	1613·4	1925·7	2254·3
	C	0·722	0·782	0·805	0·824	0·840	0·855	0·867
0·35	V	1·875	2·469	2·734	2·984	3·210	3·434	3·639
	Q	382·5	762·9	990·4	1241·3	1509·5	1802·8	2111·5
	C	0·721	0·782	0·805	0·825	0·840	0·856	0·868
0·3	V	1·733	2·286	2·530	2·762	2·975	3·184	3·372
	Q	353·5	706·4	916·5	1149·0	1399·0	1671·6	1956·6
	C	0·720	0·782	0·805	0·825	0·841	0·857	0·869
0·25	V	1·577	2·086	2·311	2·524	2·719	2·917	3·086
	Q	321·7	644·6	837·1	1050·0	1278·6	1531·4	1790·6
	C	0·718	0·782	0·805	0·826	0·842	0·858	0·871
0·2	V	1·407	1·863	2·066	2·258	2·437	2·608	2·766
	Q	287·0	575·7	748·4	939·3	1146·0	1369·2	1605·0
	C	0·716	0·781	0·805	0·826	0·844	0·860	0·873
0·15	V	1·211	1·612	1·789	1·957	2·116	2·267	2·406
	Q	247·0	498·1	648·1	814·1	995·0	1190·2	1396·0
	C	0·712	0·780	0·805	0·827	0·846	0·863	0·877
0·10	V	·9799	1·313	1·462	1·602	1·734	1·862	1·981
	Q	199·9	405·7	529·6	666·4	815·4	977·5	1149·5
	C	0·705	0·778	0·805	0·829	0·849	0·868	0·884
0·05	V	·6783	·9234	1·035	1·140	1·239	1·335	1·425
	Q	138·4	285·3	374·9	474·2	582·6	700·9	826·8
	C	0·690	0·774	0·806	0·834	0·858	0·880	0·899

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

width of 100 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 6·	6·5	7·	7·5	8·	9·	10·
0·5	V	4·573	4·796					
	Q	2908·4	3320·0					
	C	0·877	0·887					
0·45	V	4·338	4·555	4·761	4·951			
	Q	2758·9	3153·2	3566·0	3991·7			
	C	0·877	0·888	0·897	0·905			
0·4	V	4·094	4·300	4·491	4·673	4·852		
	Q	2603·8	2976·7	3363·7	3767·6	4192·1		
	C	0·878	0·889	0·898	0·906	0·914		
0·35	V	3·834	4·026	4·205	4·376	4·549	4·866	
	Q	2438·4	2787·0	3149·5	3528·1	3930·3	4773·5	
	C	0·879	0·890	0·899	0·907	0·916	0·930	
0·3	V	3·558	3·736	3·902	4·060	4·220	4·514	4·788
	Q	2262·0	2586·2	2922·6	3273·4	3646·1	4428·2	5266·8
	C	0·881	0·892	0·901	0·909	0·918	0·932	0·944
0·25	V	3·255	3·419	3·569	3·719	3·866	4·134	4·389
	Q	2070·2	2366·8	2673·2	2998·4	3340·2	4055·4	4827·9
	C	0·883	0·894	0·903	0·912	0·921	0·935	0·948
0·2	V	2·922	3·068	3·207	3·341	3·472	3·718	3·946
	Q	1858·4	2123·8	2402·0	2693·7	2999·8	3647·3	4340·6
	C	0·886	0·897	0·907	0·916	0·925	0·940	0·953
0·15	V	2·541	2·672	2·792	2·912	3·030	3·246	3·446
	Q	1616·1	1849·7	2091·2	2347·8	2617·9	3184·3	3790·6
	C	0·890	0·902	0·912	0·922	0·932	0·948	0·961
0·10	V	2·094	2·204	2·308	2·409	2·505	2·690	2·861
	Q	1331·8	1525·7	1728·7	1942·2	2164·3	2638·9	3147·1
	C	0·898	0·911	0·923	0·934	0·944	0·962	0·977
0·05	V	1·512	1·595	1·676	1·755	1·830	1·974	2·106
	Q	961·6	1104·1	1255·3	1415·0	1581·1	1936·5	2316·6
	C	0·917	0·933	0·948	0·962	0·975	0·998	1·017

and cubic feet per second.

TABLE IX.

MEAN VELOCITIES (V) OF DISCHARGE, QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-

N=0·0225.

S per thousand.		Depths of water in feet. 2·	3·	3·5	4·	4·5	5·	5·5
0·5	V	2·256	2·970	3·292	3·585	3·868	4·131	4·380
	Q	550·5	1095·9	1423·0	1778·2	2167·0	2581·9	3023·3
	C	0·724	0·784	0·807	0·825	0·842	0·856	0·868
0·45	V	2·140	2·818	3·123	3·401	3·669	3·920	4·154
	Q	522·2	1039·8	1349·9	1686·9	2055·5	2450·0	2867·3
	C	0·724	0·784	0·807	0·825	0·842	0·856	0·868
0·4	V	2·015	2·657	2·944	3·211	3·464	3·700	3·922
	Q	491·7	980·4	1272·5	1592·6	1940·7	2312·5	2707·2
	C	0·723	0·784	0·807	0·826	0·843	0·857	0·869
0·35	V	1·882	2·482	2·754	3·003	3·240	3·461	3·672
	Q	459·2	915·8	1190·4	1489·5	1815·2	2163·1	2534·6
	C	0·722	0·783	0·807	0·826	0·843	0·857	0·870
0·3	V	1·741	2·298	2·550	2·784	3·003	3·208	3·404
	Q	424·8	848·0	1102·2	1380·9	1682·4	2005·0	2349·6
	C	0·721	0·783	0·807	0·827	0·844	0·858	0·871
0·25	V	1·576	2·098	2·327	2·544	2·744	2·932	3·115
	Q	384·5	774·2	1005·8	1261·8	1537·3	1832·5	2150·1
	C	0·719	0·783	0·807	0·828	0·845	0·859	0·873
0·2	V	1·413	1·874	2·082	2·275	2·458	2·628	2·792
	Q	344·8	691·5	899·9	1128·4	1377·1	1642·5	1927·2
	C	0·717	0·782	0·807	0·828	0·846	0·861	0·875
0·15	V	1·217	1·620	1·803	1·975	2·133	2·287	2·429
	Q	296·9	597·8	779·3	979·6	1195·0	1429·4	1676·6
	C	0·713	0·781	6·807	0·830	0·848	0·865	0·879
0·10	V	·9842	1·322	1·474	1·617	1·751	1·878	2·000
	Q	240·1	487·8	637·1	802·0	981·0	1173·7	1380·5
	C	0·706	0·780	0·808	0·832	0·852	0·870	0·886
0·05	V	·6813	·9304	1·044	1·149	1·251	1·347	1·439
	Q	166·2	343·3	451·3	569·9	700·9	841·9	993·3
	C	0·691	0·776	0·809	0·836	0·861	0·883	0·902

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

width of 120 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 6·	6·5	7·	7·5	8·	9·	10·
0·5	V	4·617	4·851					
	Q	3490·4	3988·7					
	C	0·879	0·890					
0·45	V	4·386	4·607	4·810				
	Q	3315·8	3788·1	4276·1				
	C	0·880	0·891	0·899				
0·4	V	4·140	4·353	4·540	4·731	4·914		
	Q	3129·8	3579·2	4036·1	4524·0	5031·9		
	C	0·881	0·891	0·900	0·909	0·917		
0·35	V	3·876	4·067	4·251	4·430	4·607	4·932	
	Q	2929·5	3344·1	3779·1	4236·2	4717·6	5726·0	
	C	0·882	0·892	0·901	0·910	0·919	0·933	
0·3	V	3·593	3·775	3·944	4·111	4·274	4·575	4·861
	Q	2716·3	3104·0	3506·2	3931·1	4376·6	5311·6	6319·3
	C	0·883	0·894	0·903	0·912	0·921	0·935	0·948
0·25	V	3·288	3·453	3·612	3·765	3·915	4·190	4·457
	Q	2485·7	2839·2	3211·0	3600·3	4009·0	4864·6	5794·1
	C	0·885	0·896	0·906	0·915	0·924	0·938	0·952
0·2	V	2·950	3·102	3·245	3·382	3·516	3·767	4·007
	Q	2230·2	2550·6	2884·8	3234·0	3600·4	4373·5	5209·1
	C	0·888	0·900	0·910	0·919	0·928	0·943	0·957
0·15	V	2·566	2·702	2·825	2·948	3·069	3·290	3·503
	Q	1939·9	2221·7	2511·4	2819·0	3142·6	3819·7	4553·9
	C	0·892	0·905	0·915	0·925	0·935	0·951	0·966
0·1	V	2·162	2·228	2·335	2·439	2·537	2·729	2·908
	Q	1634·4	1832·0	2075·8	2332·3	2597·9	3168·4	3780·4
	C	0·901	0·914	0·926	0·937	0·947	0·966	0·982
0·05	V	1·528	1·615	1·697	1·777	1·855	2·002	2·142
	Q	1155·2	1327·9	1508·6	1699·2	1899·5	2324·3	2784·6
	C	0·920	0·937	0·952	0·966	0·979	1·002	1·023

and cubic feet per second.

TABLE IX.

MEAN VELOCITIES (V) OF DISCHARGE, QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-

N=0·0225.

S per thousand.		Depths of water in feet. 2·	3·	3.5	4·	4·5	5·	5·5
0·5	V	2·263	2·984	3·311	3·608	3·890	4·155	4·412
	Q	642·7	1280·1	1662·9	2078·2	2529·5	3012·4	3530·7
	C	0·725	0·785	0·809	0·827	0·843	0·857	0·870
0·45	V	2·147	2·831	3·141	3·423	3·690	3·942	4·185
	Q	609·7	1214·5	1577·6	1971·6	2399·4	2857·9	3349·0
	C	0·725	0·785	0·809	0·827	0·843	0·857	0·870
0·4	V	2·022	2·668	2·962	3·231	3·483	3·721	3·951
	Q	574·2	1144·6	1487·7	1861·0	2264·8	2697·7	3161·8
	C	0·724	0·785	0·809	0·828	0·844	0·858	0·871
0·35	V	1·888	2·496	2·771	3·022	3·258	3·481	3·700
	Q	536·2	1070·8	1391·7	1740·7	2280·8	2523·7	2960·9
	C	0·723	0·785	0·809	0·828	0·844	0·858	0·872
0·3	V	1·746	2·308	2·564	2·801	3·020	3·226	3·429
	Q	495·9	990·1	1287·8	1613·4	1963·7	2338·8	2744·0
	C	0·722	0·784	0·809	0·829	0·845	0·859	0·873
0·25	V	1·590	2·107	2·341	2·557	2·760	2·949	3·138
	Q	451·6	903·9	1175·8	1472·8	1794·7	2138·0	2511·2
	C	0·720	0·784	0·809	0·829	0·846	0·860	0·875
0·2	V	1·418	1·882	2·094	2·290	2·471	2·644	2·812
	Q	402·7	807·4	1051·7	1319·0	1606·8	1916·9	2250·3
	C	0·718	0·783	0·809	0·830	0·847	0·862	0·877
0·15	V	1·221	1·628	1·816	1·988	2·145	2·300	2·447
	Q	346·8	698·4	912·1	1145·1	1394·8	1667·5	1958·2
	C	0·714	0·782	0·810	0·832	0·849	0·866	0·881
0·10	V	·9877	1·328	1·482	1·627	1·760	1·889	2·014
	Q	280·5	569·7	744·3	937·1	1144·4	1369·5	1611·7
	C	0·707	0·781	0·810	0·834	0·853	0·871	0·888
0·05	V	·6837	·9339	1·050	1·156	1·258	1·357	1·452
	Q	194·2	400·6	527·4	665·8	818·0	983·8	1161·9
	C	0·692	0·777	0·811	0·838	0·862	0·885	0·905

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

width of 140 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 6·	6·5	7·	7·5	8·	9·	10·
0·5	V	4·653	4·893					
	Q	4076·0	4659·3					
	C	0·881	0·891					
0·45	V	4·420	4·641	4·850				
	Q	3871·9	4419·4	4990·6				
	C	0·882	0·892	0·901				
0·4	V	4·171	4·379	4·578	4·773			
	Q	3653·8	4169·9	4710·8	5280·1			
	C	0·883	0·893	0·902	0·911			
0·35	V	3·907	4·102	4·286	4·470			
	Q	3422·5	3906·1	4410·3	4944·9			
	C	0·884	0·894	0·903	0·912			
0·3	V	3·620	3·805	3·977	4·148		4·620	4·912
	Q	3171·1	3623·3	4092·3	4588·7		6195·4	7368·0
	C	0·885	0·896	0·905	0·914		0·937	0·950
0·25	V	3·313	3·487	3·643	3·798	3·950	4·235	4·503
	Q	2902·2	3320·5	3748·6	4201·5	4676·8	5679·1	6754·5
	C	0·887	0·898	0·908	0·917	0·926	0·941	0·954
0·2	V	2·973	3·125	3·272	3·412	3·549	3·808	4·048
	Q	2604·3	2975·8	3366·9	3774·5	4202·0	5106·5	6072·0
	C	0·890	0·901	0·912	0·921	0·930	0·946	0·959
0·15	V	2·586	2·721	2·853	2·977	3·097	3·326	3·539
	Q	2265·3	2591·1	2935·7	3293·3	3666·8	4460·2	5308·5
	C	0·894	0·906	0·918	0·928	0·937	0·954	0·968
0·1	V	2·133	2·246	2·355	2·460	2·993	2·756	2·940
	Q	1868·5	2138·7	2423·3	2721·4	3543·7	3695·8	4410·0
	C	0·903	0·916	0·928	0·939	0·950	0·968	0·985
0·05	V	1·541	1·630	1·713	1·794	2·117	2·025	2·165
	Q	1349·9	1552·1	1762·7	1984·6	2506·5	2715·5	3247·5
	C	0·923	0·940	0·955	0·968	0·982	1·006	1·026

and cubic feet per second.

TABLE IX.

Mean Velocities (V) of Discharge, Quantities dis-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-

N=0·0225.

S per thousand.		Depths of water in feet. 2·	3·	4·	4·5	5·	5·5	6·
0·5	V	2·267	2·994	3·627	3·907	4·176	4·435	4·679
	Q	734·5	1464·1	2379·3	2892·1	3445·2	3695·9	4660·3
	C	0·725	0·786	0·829	0·844	0·858	0·871	0·882
0·45	V	2·151	2·841	3·441	3·707	3·961	4·213	4·443
	Q	696·9	1389·2	2257·3	2744·1	3267·8	3834·9	4425·2
	C	0·725	0·786	0·829	0·844	0·858	0·872	0·883
0·4	V	2·025	2·678	3·245	3·498	3·739	3·972	4·194
	Q	656·1	1309·5	2128·7	2589·4	3084·7	3615·5	4177·2
	C	0·724	0·786	0·829	0·845	0·859	0·872	0·884
0·35	V	1·891	2·505	3·035	3·273	3·498	3·719	3·928
	Q	612·7	1224·9	1991·0	2422·8	2885·8	3385·2	3912·3
	C	0·723	0·786	0·829	0·845	0·859	0·873	0·885
0·3	V	1·749	2·316	2·813	3·034	3·242	3·447	3·640
	Q	566·8	1132·5	1845·3	2245·9	2674·6	3137·6	3625·4
	C	0·722	0·785	0·830	0·846	0·860	0·874	0·886
0·25	V	1·592	2·114	2·568	2·772	2·963	3·154	3·331
	Q	515·8	1033·7	1684·6	2051·9	2444·5	2870·9	3317·7
	C	0·720	0·785	0·830	0·847	0·861	0·876	0·888
0·2	V	1·419	1·889	2·299	2·482	2·656	2·828	2·989
	Q	459·7	923·7	1508·1	1837·3	2191·2	2574·2	2977·0
	C	0·718	0·784	0·831	0·848	0·863	0·878	0·891
0·15	V	1·223	1·633	1·994	2·155	2·311	2·459	2·600
	Q	396·2	798·5	1308·1	1595·2	1906·6	2238·3	2589·6
	C	0·714	0·783	0·832	0·850	0·867	0·882	0·895
0·10	V	·9891	1·332	1·634	1·770	1·898	2·025	2·150
	Q	320·5	651·3	1071·9	1310·2	1565·8	1843·2	2141·4
	C	0·707	0·782	0·835	0·855	0·872	0·889	0·904
0·05	V	·6845	·9375	1·161	1·265	1·363	1·459	1·552
	Q	221·8	458·4	761·6	936·4	1124·5	1328·0	1545·8
	C	0·692	0·778	0·839	0·864	0·886	0·906	0·925

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

width of 160 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 6·5	7·	7·5	8·	9·	10·	12·
0·5	V	4·912						
	Q	5316·0						
	C	0·892						
0·45	V	4·666	4·877					
	Q	5049·8	5701·2					
	C	0·893	0·902					
0·4	V	4·404	4·603	4·801				
	Q	4766·2	5380·9	6031·2				
	C	0·894	0·903	0·912				
0·35	V	4·124	4·316	4·495	4·679			
	Q	4463·2	5045·4	5646·8	6288·6			
	C	0·895	0·905	0·913	0·922			
0·3	V	3·827	4·004	4·172	4·342	4·657	4·949	
	Q	4141·8	4680·7	5241·1	5835·6	7083·3	8413·3	
	C	0·897	0·907	0·915	0·924	0·939	0·951	
0·25	V	3·502	3·663	3·820	3·976	4·270	5·037	
	Q	3790·0	4282·0	4798·9	5343·7	6494·7	8562·9	
	C	0·899	0·909	0·918	0·927	0·943	0·955	
0·2	V	3·142	3·291	3·432	3·575	3·839	4·084	4·539
	Q	3400·4	3847·2	4311·4	4804·8	5839·1	6942·8	9368·5
	C	0·902	0·913	0·922	0·932	0·948	0·961	0·984
0·15	V	2·736	2·869	2·994	3·120	3·353	3·570	3·971
	Q	2961·0	3353·9	3761·2	4193·3	5099·9	6069·0	8196·1
	C	0·907	0·919	0·929	0·939	0·956	0·970	0·994
0·1	V	2·258	2·370	2·477	2·583	2·778	2·966	3·308
	Q	2443·7	2770·5	3111·7	3471·5	4225·3	5042·2	6827·7
	C	0·917	0·930	0·941	0·952	0·970	0·987	1·014
0·05	V	1·639	1·725	1·803	1·887	2·041	2·187	2·455
	Q	1773·8	2016·5	2265·0	2536·1	3104·4	3718·0	5067·1
	C	0·941	0·957	0·969	0·984	1·008	1·029	1·064

and cubic feet per second.

TABLE IX.

MEAN VELOCITIES (V) OF DISCHARGE, QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-

N=0·0225.

S per thousand.		Depths of water in feet. 2·	3·	4·	4·5	5·	5·5	6·
0·5	V	2·273	3·003	3·636	3·922	4·198	4·448	4·700
	Q	827·4	1648·6	2676·1	3256·2	3883·1	4538·1	5245·2
	C	0·726	0·787	0·829	0·845	0·860	0·871	0·883
0·45	V	2·157	2·849	3·449	3·720	3·982	4·225	4·458
	Q	785·1	1564·1	2538·5	3088·5	3683·3	4310·5	4975·1
	C	0·726	0·787	0·829	0·845	0·860	0·872	0·883
0·4	V	2·031	2·686	3·252	3·507	3·759	3·988	4·208
	Q	739·3	1474·6	2393·5	2911·7	3477·1	4068·7	469·6
	C	0·725	0·787	0·829	0·845	0·861	0·873	0·884
0·35	V	1·897	2·510	3·042	3·285	3·516	3·735	3·941
	Q	690·5	1378·0	2238·9	2727·4	3252·3	3810·6	4398·1
	C	0·724	0·786	0·829	0·846	0·861	0·874	0·885
0·3	V	1·753	2·323	2·819	3·044	3·259	3·461	3·657
	Q	638·0	1275·3	2074·8	2527·3	3014·6	3531·1	4081·2
	C	0·723	0·786	0·830	0·847	0·862	0·875	0·887
0·25	V	1·596	2·121	2·574	2·783	2·978	3·167	3·342
	Q	580·9	1164·4	1894·5	2310·6	2754·6	3231·1	3729·7
	C	0·721	0·786	0·830	0·848	0·863	0·877	0·888
0·2	V	1·424	1·894	2·305	2·492	2·670	2·839	3·002
	Q	518·3	1039·8	1696·5	2069·0	2469·7	2896·5	3350·2
	C	0·719	0·785	0·831	0·849	0·865	0·879	0·892
0·15	V	1·226	1·638	1·998	2·163	2·320	2·470	2·612
	Q	446·3	899·3	1470·5	1795·8	2146·0	2520·0	2915·0
	C	0·715	0·784	0·832	0·851	0·868	0·883	0·896
0·10	V	·9912	1·335	1·638	1·775	1·908	2·033	2·154
	Q	360·8	732·9	1205·6	1473·7	1764·9	2074·2	2403·9
	C	0·708	0·782	0·835	0·855	0·874	0·890	0·905
0·05	V	·6868	·9390	1·165	1·270	1·371	1·465	1·558
	Q	250·0	515·5	857·4	1054·4	1268·2	1494·7	1738·7
	C	0·693	0·778	0·840	0·865	0·888	0·907	0·926

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

width of 180 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 6·5	7·	7·5	8·	9·	10·	12·
0·5	V	4·942						
	Q	5990·9						
	C	0·894						
0·45	V	4·693	4·903					
	Q	5689·1	6418·0					
	C	0·895	0·903					
0·4	V	4·430	4·627	4·821	5·019			
	Q	5370·3	6056·7	6779·5	7548·6			
	C	0·896	0·904	0·913	0·921			
0·35	V	4·149	4·339	4·515	4·705	5·049		
	Q	5029·6	5679·7	6349·2	7075·6	8588·3		
	C	0·897	0·906	0·914	0·923	0·938		
0·3	V	3·849	4·025	4·190	4·365	4·685	4·985	
	Q	4665·9	5268·7	5892·2	6565·0	7969·2	9471·5	
	C	0·899	0·908	0·916	0·925	0·940	0·953	
0·25	V	3·521	3·683	3·837	3·997	4·295	4·570	5·080
	Q	4268·3	4821·0	5395·8	6011·5	7305·8	8683·0	11704·3
	C	0·901	0·910	0·919	0·928	0·944	0·957	0·979
0·2	V	3·160	3·308	3·447	3·594	3·861	4·109	4·571
	Q	3830·7	4330·1	4847·3	5405·4	6567·6	7807·1	10531·6
	C	0·904	0·914	0·923	0·933	0·949	0·962	0·985
0·15	V	2·754	2·884	3·008	3·136	3·372	3·592	4·003
	Q	3338·5	3775·1	4230·0	4716·5	5735·8	6824·8	9222·9
	C	0·910	0·920	0·930	0·940	0·957	0·971	0·996
0·10	V	2·274	2·383	2·488	2·596	2·796	2·984	3·334
	Q	2756·6	3119·3	3498·7	3904·4	4756·0	5670·	7681·
	C	0·920	0·931	0·942	0·953	0·972	0·988	1·016
0·05	V	1·652	1·736	1·812	1·899	2·055	2·202	2·475
	Q	2002·6	2272·4	2548·1	2856·1	3495·5	4183·8	5702·4
	C	0·945	0·959	0·970	0·986	1·010	1·031	1·067

and cubic feet per second.

TABLE IX.

Mean Velocities of Discharge (V), Quantities dis-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-

N=0·0225.

S per thousand.		Depths of water in feet. 2·	3·	4·	4·5	5·	5·5	6·
0·5	V	2·275	3·007	3·643	3·930	4·207	4·465	4·718
	Q	919·1	1831·3	2972·7	3616·6	4312·2	5046·6	5831·4
	C	0·726	0·787	0·829	0·845	0·860	0·872	0·884
0·45	V	2·158	2·853	3·456	3·728	3·991	4·240	4·476
	Q	871·8	1737·5	2820·1	3430·7	4090·8	4792·3	5532·3
	C	0·726	0·787	0·829	0·845	0·860	0·873	0·884
0·4	V	2·032	2·690	3·259	3·518	3·768	3·997	4·224
	Q	820·9	1638·2	2659·3	3237·4	3862·2	4517·6	5220·9
	C	0·725	0·787	0·829	0·846	0·861	0·873	0·885
0·35	V	1·898	2·516	3·048	3·292	3·528	3·744	3·956
	Q	766·8	1532·2	2487·2	3029·5	3616·2	4231·6	4889·6
	C	0·724	0·787	0·829	0·846	0·862	0·874	0·886
0·3	V	1·755	2·329	2·825	3·052	3·266	3·470	3·671
	Q	709·0	1418·4	2305·2	2808·6	3347·6	3922·0	4537·3
	C	0·723	0·787	0·830	0·847	0·862	0·875	0·888
0·25	V	1·598	2·124	2·579	2·788	2·985	3·174	3·359
	Q	645·6	1293·5	2104·5	2565·6	3059·6	3587·4	4151·7
	C	0·721	0·786	0·830	0·848	0·863	0·877	0·890
0·2	V	1·425	1·900	2·309	2·500	2·676	2·849	3·015
	Q	575·7	1157·1	1884·1	2300·6	2742·9	3220·1	3726·5
	C	0·719	0·786	0·831	0·850	0·865	0·880	0·893
0·15	V	1·226	1·643	2·004	2·167	2·329	2·479	2·622
	Q	495·3	1000·6	1635·3	1994·2	2387·2	2801·9	3240·8
	C	0·715	0·785	0·833	0·851	0·869	0·884	0·897
0·10	V	·9926	1·338	1·642	1·780	1·914	2·040	2·163
	Q	401·0	814·8	1339·9	1638·0	1961·8	2305·7	2673·5
	C	0·708	0·783	0·835	0·856	0·875	0·891	0·906
0·05	V	·6868	·9418	1·169	1·274	1·375	1·470	1·565
	Q	277·5	573·5	953·9	1172·4	1409·4	1661·4	1934·3
	C	0·693	0·779	0·841	0·866	0·889	0·908	0·927

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

width of 200 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 6·5	7·	7·5	8·	9·	10·	12·
	V	4·961						
0·5	Q	6658·9						
	C	0·895						
	V	4·712	4·923					
0·45	Q	6324·7	7133·4					
	C	0·896	0·904					
	V	4·447	4·647	4·849	5·041			
0·4	Q	5969·0	6733·5	7546·2	8388·2			
	C	0·897	0·905	0·914	0·922			
	V	4·165	4·356	4·545	4·726	5·069		
0·35	Q	5590·5	6311·8	7073·1	7864·1	9534·8		
	C	0·898	0·907	0·916	0·924	0·938		
	V	3·865	4·042	4·217	4·385	4·708	5·011	
0·3	Q	5187·8	5856·8	6562·7	7296·6	8855·7	10523·	
	C	0·900	0·909	0·918	0·926	0·941	0·954	
	V	3·536	3·699	3·863	4·016	4·316	4·594	5·098
0·25	Q	4746·2	5359·8	6011·8	6682·6	8118·4	9647·4	12969·3
	C	0·902	0·911	0·921	0·929	0·945	0·958	0·978
	V	3·173	3·321	3·470	3·612	3·881	4·030	4·602
0·2	Q	4258·9	4812·1	5400·2	6010·4	7300·2	8673·0	11707·5
	C	0·905	0·915	0·925	0·934	0·950	0·963	0·987
	V	2·763	2·896	3·027	3·150	3·388	3·615	4·030
0·15	Q	3708·6	4196·3	4710·8	5241·6	6372·8	7591·5	10252·3
	C	0·910	0·921	0·932	0·941	0·958	0·973	0·998
	V	2·281	2·393	2·504	2·608	2·813	3·003	3·356
0·10	Q	3061·7	3467·4	3896·8	4339·7	5291·2	6306·3	8537·7
	C	0·920	0·932	0·944	0·954	0·974	0·990	1·018
	V	1·656	1·742	1·827	1·912	2·067	2·216	2·493
0·05	Q	2222·8	2524·1	2843·3	3181·6	3888·0	4653·6	6342·2
	C	0·945	0·960	0·974	0·988	1·012	1·033	1·069

and cubic feet per second.

TABLE IX.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-

N=0·0225.

S per thousand.		Depths of water in feet. 2·	3·	4·	4·5	5·	5·5	6·
0·5	V	2·280	3·015	3·648	3·941	4·215	4·479	4·728
	Q	1012·3	2017·0	3268·6	3981·4	4741·9	5555·1	6411·2
	C	0·727	0·788	0·829	0·846	0·860	0·873	0·884
0·45	V	2·163	2·860	3·461	3·739	4·063	4·249	4·490
	Q	960·4	1913·3	3101·0	3777·3	4570·9	5269·8	6088·4
	C	0·727	0·788	0·829	0·846	0·860	0·873	0·885
0·4	V	2·037	2·693	3·267	3·529	3·775	4·011	4·234
	Q	904·4	1801·6	2927·2	3565·2	4246·9	4974·6	5741·3
	C	0·726	0·787	0·830	0·847	0·861	0·874	0·885
0·35	V	1·902	2·519	3·056	3·301	3·535	3·756	3·965
	Q	844·5	1685·2	2738·2	3334·8	3976·9	4658·4	5376·5
	C	0·725	0·787	0·830	0·847	0·862	0·875	0·886
0·3	V	1·756	2·333	2·833	3·059	3·277	3·481	3·679
	Q	779·7	1560·8	2538·4	3090·3	3686·6	4317·3	4988·7
	C	0·723	0·787	0·831	0·848	0·863	0·876	0·888
0·25	V	1·599	2·130	2·586	2·797	2·995	3·185	3·366
	Q	709·9	1424·9	2317·0	2825·7	3369·4	3950·2	4564·3
	C	0·721	0·787	0·831	0·849	0·864	0·878	0·890
0·2	V	1·426	1·902	2·316	2·507	2·685	2·856	3·021
	Q	633·1	1272·4	2075·1	2532·7	3020·6	3542·1	4096·5
	C	0·719	0·786	0·832	0·851	0·866	0·880	0·893
0·15	V	1·230	1·645	2·007	2·172	2·333	2·484	2·631
	Q	546·1	1100·5	1798·3	2194·3	2624·6	3080·8	3567·6
	C	0·716	0·785	0·833	0·851	0·869	0·884	0·898
0·10	V	·9947	1·341	1·645	1·784	1·918	2·047	2·169
	Q	441·6	897·1	1473·9	1802·3	2157·8	2538·8	2941·2
	C	0·709	0·784	0·836	0·856	0·875	0·892	0·907
0·05	V	·6884	·9438	1·171	1·277	1·378	1·475	1·570
	Q	305·6	631·4	1049·2	1290·1	1550·2	1829·4	2128·9
	C	0·694	0·780	0·841	0·867	0·889	0·909	0·928

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

width of 220 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 6·5	7·	7·5	8·	9·	10·	12·
0·5	V	4·973						
	Q	7321·5						
	C	0·895						
0·45	V	4·724	4·942					
	Q	6954·9	7852·8					
	C	0·896	0·905					
0·4	V	4·458	4·664	4·867	5·062			
	Q	6563·3	7411·1	8304·3	9233·1			
	C	0·897	0·906	0·915	0·923			
0·35	V	4·176	4·368	4·563	4·744	5·090		
	Q	6148·1	6940·7	7785·6	8653·0	10490·		
	C	0·898	0·907	0·917	0·925	0·939		
0·3	V	3·874	4·053	4·234	4·402	4·728	5·035	
	Q	5703·5	6440·2	7224·3	8029·2	9744·4	11580·0	
	C	0·900	0·909	0·919	0·927	0·942	0·955	
0·25	V	3·544	3·713	3·878	4·032	4·334	4·615	5·125
	Q	5217·6	5900·0	6616·8	7354·4	8932·4	10614·5	14268·0
	C	0·902	0·912	0·922	0·930	0·946	0·959	0·979
0·2	V	3·184	3·331	3·484	3·626	3·897	4·150	4·626
	Q	4687·6	5292·9	5944·6	6613·8	8031·7	9545·0	12878·8
	C	0·906	0·915	0·926	0·935	0·951	0·964	0·988
0·15	V	2·773	2·903	3·039	3·164	3·403	3·631	4·051
	Q	4082·5	4612·9	5185·3	5771·1	7013·6	8351·3	11278·0
	C	0·911	0·921	0·933	0·942	0·959	0·974	0·999
0·10	V	2·289	2·401	2·514	2·619	2·825	3·017	3·374
	Q	3367·0	3815·2	4289·5	4777·0	5822·3	6939·1	9393·2
	C	0·921	0·933	0·945	0·955	0·975	0·991	1·019
0·05	V	1·660	1·749	1·836	1·918	2·076	2·226	2·505
	Q	2443·9	2779·2	3132·7	3498·4	4278·6	5119·8	6973·9
	C	0·945	0·961	0·976	0·989	1·013	1·034	1·071

and cubic feet per second.

TABLE IX.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-

N=0·0225.

S per thousand.		Depths of water in feet. 2·	3·	4·	4·5	5·	5·5	6·
0·5	V	2·281	3·018	3·653	3·946	4·222	4·491	4·743
	Q	1104·0	2200·1	3565·3	4341·6	5171·9	6064·0	7000·7
	C	0·727	0·788	0·829	0·846	0·860	0·874	0·885
0·45	V	2·164	2·863	3·470	3·744	4·010	4·261	4·499
	Q	1047·4	2087·1	3386·7	4119·3	4912·2	5753·4	6640·5
	C	0·727	0·788	0·830	0·846	0·861	0·874	0·885
0·4	V	2·038	2·700	3·272	3·534	3·785	4·022	4·247
	Q	986·4	1968·3	3193·5	3888·3	4636·6	5430·7	6268·6
	C	0·726	0·788	0·830	0·847	0·862	0·875	0·886
0·35	V	1·904	2·521	3·059	3·306	3·544	3·767	3·976
	Q	921·5	1837·8	2985·6	3637·4	4341·4	5086·4	5868·6
	C	0·725	0·787	0·830	0·847	0·863	0·876	0·887
0·3	V	1·758	2·334	2·836	3·065	3·286	3·491	3·690
	Q	850·9	1701·5	2767·9	3372·3	4025·3	4713·7	5446·4
	C	0·723	0·787	0·831	0·848	0·864	0·877	0·889
0·25	V	1·600	2·131	2·589	2·800	3·002	3·194	3·376
	Q	774·4	1553·5	2526·9	3080·7	3677·4	4312·7	4983·0
	C	0·721	0·787	0·831	0·849	0·865	0·879	0·891
0·2	V	1·427	1·904	2·319	2·511	2·692	2·864	3·031
	Q	690·7	1388·0	2263·3	2762·7	3297·8	3867·1	4473·7
	C	0·719	0·786	0·832	0·851	0·867	0·881	0·894
0·15	V	1·231	1·647	2·010	2·179	2·339	2·492	2·638
	Q	595·8	1200·7	1961·8	2397·4	2865·3	3364·8	3892·2
	C	0·716	0·785	0·833	0·853	0·870	0·885	0·899
0·10	V	·9954	1·343	1·648	1·788	1·924	2·053	2·176
	Q	481·8	979·0	1608·4	1967·3	2356·9	2772·1	3211·8
	C	0·709	0·784	0·836	0·857	0·876	0·893	0·908
0·05	V	·6891	·9446	1·174	1·281	1·382	1·481	1·575
	Q	333·5	688·6	1145·8	1409·4	1692·9	1999·8	2324·7
	C	0·694	0·780	0·842	0·868	0·890	0·911	0·929

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

width of 240 feet.

N= ·0225.

S per thousand.		Depths of water in feet. 6·5	7·	7·5	8·	9·	10·	12·
0·5	V	4·983						
	Q	7984·0						
	C	0·895						
0·45	V	4·733	4·953					
	Q	7583·4	8563·7					
	C	0·896	0·905					
0·4	V	4·467	4·674	4·878	5·074			
	Q	7157·2	8081·3	9054·8	10067·			
	C	0·897	0·906	0·915	0·923			
0·35	V	4·184	4·377	4·573	4·756	5·110		
	Q	6703·8	7567·8	8488·6	9435·9	11451·		
	C	0·898	0·907	0·917	0·925	0·940		
0·3	V	3·882	4·061	4·243	4·412	4·745	5·055	
	Q	6219·9	7021·5	7876·1	8753·4	10633·5	12638·3	
	C	0·900	0·909	0·919	0·927	0·943	0·956	
0·25	V	3·551	3·720	3·885	4·041	4·350	4·634	5·165
	Q	5689·6	6431·9	7211·5	8017·3	9748·3	11585·0	15619·0
	C	0·902	0·912	0·922	0·930	0·947	0·960	0·983
0·2	V	3·190	3·341	3·491	3·634	3·912	4·166	4·647
	Q	5111·2	5776·6	6480·2	7209·8	8766·8	10415·0	14052·5
	C	0·906	0·916	0·926	0·935	0·952	0·965	0·989
0·15	V	2·778	2·912	3·046	3·171	3·416	3·645	4·069
	Q	4451·0	5034·8	5654·1	6291·3	7655·2	9112·5	12304·6
	C	0·911	0·922	0·933	0·942	0·960	0·975	1·000
0·10	V	2·293	2·410	2·522	2·625	2·835	3·029	3·389
	Q	3673·9	4166·9	4681·5	5208·0	6353·2	7572·5	10248·3
	C	0·921	0·934	0·946	0·955	0·976	0·992	1·020
0·05	V	1·666	1·755	1·842	1·923	2·084	2·237	2·521
	Q	2669·3	3034·4	3419·2	3815·2	4670·2	5592·5	7623·5
	C	0·946	0·962	0·977	0·989	1·014	1·036	1·073

and cubic feet per second.

TABLE IX.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-

N=0·0225.

S per thousand.		Depths of water in feet. 3·	3·5	4·	4·5	5·	5·5	6·
0·5	V	3·020	3·352	3·661	3·952	4·233	4·498	4·750
	Q	2410·0	3091·4	3866·0	4703·9	5608·7	6568·2	7581·0
	C	0·788	0·811	0·830	0·846	0·861	0·874	0·885
0·45	V	2·866	3·181	3·473	3·754	4·016	4·269	4·511
	Q	2287·1	2933·7	3667·5	4468·2	5321·2	6233·8	7199·5
	C	0·788	0·811	0·830	0·847	0·861	0·874	0·886
0·4	V	2·701	2·998	3·275	3·539	3·790	4·028	4·258
	Q	2155·4	2764·9	3458·4	4212·3	5021·7	5881·9	6795·8
	C	0·788	0·811	0·830	0·847	0·862	0·875	0·887
0·35	V	2·528	2·804	3·063	3·314	3·549	3·773	3·988
	Q	2017·3	2586·0	3234·5	3944·5	4702·4	5509·5	6364·8
	C	0·788	0·811	0·830	0·848	0·863	0·876	0·888
0·3	V	2·337	2·597	2·839	3·072	3·290	3·496	3·701
	Q	1864·9	2395·1	2998·0	3656·4	4359·2	5105·0	5906·8
	C	0·787	0·811	0·831	0·849	0·864	0·877	0·890
0·25	V	2·133	2·370	2·592	2·807	3·007	3·199	3·385
	Q	1702·1	2185·7	2737·1	4531·3	3984·3	4671·3	5402·5
	C	0·787	0·811	0·831	0·850	0·865	0·879	0·892
0·2	V	1·908	2·183	2·321	2·514	2·695	2·871	3·038
	Q	1522·6	2013·3	2451·0	2992·3	3570·9	4192·4	4848·6
	C	0·787	0·812	0·832	0·851	0·867	0·882	0·895
0·15	V	1·651	1·838	2·015	2·182	2·342	2·495	2·643
	Q	1317·5	1695·1	2127·8	2597·1	3103·1	3643·3	4218·2
	C	0·786	0·812	0·834	0·853	0·870	0·885	0·899
0·10	V	1·344	1·501	1·649	1·792	1·916	2·056	2·182
	Q	1072·5	1384·3	1741·3	2132·9	2538·7	3002·3	3482·5
	C	0·784	0·812	0·836	0·858	0·876	0·893	0·909
0·05	V	·9454	1·095	1·174	1·282	1·385	1·483	1·579
	Q	754·4	1009·9	1239·7	1525·9	1835·1	2165·5	2520·1
	C	0·780	0·814	0·842	0·868	0·891	0·911	0·930

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

width of 260 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 6·5	7·	8·	9·	10·	12·	14·
0·5	V	4·998						
	Q	8657·8						
	C	0·896						
0·45	V	4·747	4·967					
	Q	8223·0	9283·3					
	C	0·897	0·906					
0·4	V	4·480	4·688	5·084				
	Q	7760·5	8761·9	10900·1				
	C	0·898	0·907	0·923				
0·35	V	4·196	4·390	4·766	5·121			
	Q	7268·5	8204·9	10218·3	12397·9			
	C	0·899	0·908	0·925	0·940			
0·3	V	3·893	4·078	4·423	4·756	5·068		
	Q	6743·6	7621·8	9482·9	11514·3	13683·6		
	C	0·901	0·911	0·927	0·943	0·956		
0·25	V	3·561	3·731	4·050	4·360	4·645	5·178	
	Q	6168·5	6973·2	8683·2	10555·6	12541·5	16901·0	
	C	0·903	0·913	0·930	0·947	0·960	0·983	
0·2	V	3·200	3·352	3·642	3·920	4·181	4·660	5·100
	Q	5543·2	6264·9	7808·4	9490·3	11288·7	15210·2	19563·6
	C	0·907	0·917	0·935	0·952	0·966	0·989	1·008
0·15	V	2·786	2·921	3·177	3·424	3·654	4·084	4·474
	Q	4826·0	5459·3	6811·5	8289·5	9865·8	13330·2	17162·3
	C	0·912	0·923	0·942	0·960	0·975	1·001	1·021
0·10	V	2·300	2·417	2·633	2·842	3·038	3·402	3·735
	Q	3984·2	4517·4	5645·1	6880·5	8202·6	11104·1	14327·5
	C	0·922	0·935	0·956	0·976	0·993	1·021	1·044
0·05	V	1·670	1·760	1·926	2·090	2·244	2·530	2·796
	Q	2892·8	3289·4	4129·3	5059·9	6058·8	8257·9	10725·4
	C	0·947	0·963	0·989	1·015	1·037	1·074	1·105

and cubic feet per second.

TABLE IX.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-

N=0·0225.

S per thousand.		Depths of water in feet. 3·	3·5	4·	4·5	5·	5·5	6·
0·5	V	3·027	3·356	3·665	3·961	4·238	4·505	4·757
	Q	2569·9	3330·0	4163·4	5071·1	6039·1	7073·9	8163·0
	C	0·789	0·811	0·830	0·847	0·861	0·874	0·885
0·45	V	2·867	3·183	3·477	3·757	4·020	4·274	4·518
	Q	2434·1	3158·3	3949·9	4809·9	5728·5	6711·2	7752·9
	C	0·788	0·811	0·830	0·847	0·861	0·874	0·886
0·4	V	2·704	3·001	3·282	3·546	3·794	4·034	4·264
	Q	2295·7	2977·7	3728·3	4539·8	5406·4	6334·4	7317·0
	C	0·788	0·811	0·831	0·848	0·862	0·875	0·887
0·35	V	2·529	2·807	3·070	3·317	3·550	3·777	3·993
	Q	2147·1	2785·2	3487·5	4246·6	5058·7	5930·8	6852·0
	C	0·788	0·811	0·831	0·848	0·862	0·876	0·888
0·3	V	2·341	2·606	2·843	3·075	3·290	3·501	3·705
	Q	1987·5	2585·8	3229·6	3936·8	4688·2	5497·4	6357·8
	C	0·788	0·811	0·831	0·849	0·863	0·877	0·890
0·25	V	2·135	2·373	2·597	2·811	3·011	3·205	3·390
	Q	1812·6	2354·6	2950·2	3598·8	4290·7	5032·6	5817·2
	C	0·787	0·811	0·832	0·850	0·865	0·879	0·892
0·2	V	1·909	2·124	2·326	2·516	2·699	2·875	3·042
	Q	1620·7	2107·5	2642·3	3221·1	3846·1	4514·5	5220·1
	C	0·787	0·812	0·833	0·851	0·867	0·882	0·895
0·15	V	1·651	1·840	2·017	2·184	2·345	2·501	2·647
	Q	1401·7	1825·7	2291·2	2796·1	3341·6	3927·2	4542·2
	C	0·786	0·812	0·834	0·853	0·870	0·886	0·899
0·10	V	1·347	1·504	1·653	1·794	1·930	2·061	2·185
	Q	1143·6	1492·3	1877·8	2296·8	2750·2	3236·3	3749·5
	C	0·785	0·813	0·837	0·858	0·877	0·894	0·909
0·05	V	·9473	1·065	1·178	1·294	1·389	1·486	1·583
	Q	804·2	1056·7	1338·2	1656·6	1979·3	2333·4	2716·4
	C	0·781	0·814	0·843	0·868	0·892	0·912	0·931

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

width of 280 feet.

N=0·0225.

S per thousand.		Depths of water in feet.						
		6·5	7·	8·	9·	10·	12·	14·
0·5	V	5·005						
	Q	9320·5						
	C	0·896						
0·45	V	4·753	4·975					
	Q	8851·3	9994·8					
	C	0·897	0·906					
0·4	V	4·486	4·695	5·099				
	Q	8354·0	9432·2	11748·1				
	C	0·898	0·907	0·924				
0·35	V	4·022	4·397	4·780	5·137			
	Q	7490·0	8833·6	11013·1	13361·3			
	C	0·899	0·908	0·926	0·941			
0·3	V	3·899	4·084	4·435	4·771	5·084		
	Q	7260·9	8204·7	10218·2	12409·4	14743·6		
	C	0·901	0·911	0·928	0·944	0·957		
0·25	V	3·567	3·737	4·061	4·374	4·661	5·197	
	Q	6642·6	7507·6	9356·5	11376·8	13516·9	18210·3	
	C	0·903	0·913	0·931	0·948	0·961	0·984	
0·2	V	3·204	3·357	3·652	3·933	4·194	4·677	5·120
	Q	5966·6	6744·2	8414·2	10229·7	12162·6	16388·2	21073·9
	C	0·907	0·917	0·936	0·953	0·967	0·990	1·009
0·15	V	2·790	2·929	3·186	3·435	3·666	4·099	4·492
	Q	5195·7	5884·4	7340·5	8934·4	10631·4	14362·9	18489·1
	C	0·912	0·924	0·943	0·961	0·976	1·002	1·022
0·1	V	2·306	2·421	2·641	2·851	3·048	3·414	3·750
	Q	4294·3	4863·8	6084·9	7415·4	8839·2	11962·6	15435·0
	C	0·923	0·935	0·956	0·977	0·994	1·022	1·045
0·05	V	1·675	1·765	1·931	2·097	2·251	2·539	2·807
	Q	3119·3	3545·9	4449·0	5454·3	6527·9	8896·6	11553·6
	C	0·948	0·964	0·990	1·016	1·038	1·075	1·106

and cubic feet per second.

TABLE IX.

Mean Velocities of Discharge (V), Quantities dis-

For Canals in Earth, Class II., above the average, of Trapezoidal

For a Bed-

N=0·0225.

S per thousand		Depths of water in feet. 3·	3·5	4·	4·5	5·	5·5	6·
0·5	V	3·029	3·357	3·672	3·965	4·247	4·510	4·767
	Q	2753·4	3566·0	4465·1	5433·0	6476·7	7577·9	8752·2
	C	0·789	0·811	0·831	0·847	0·862	0·874	0·886
0·45	V	2·873	3·185	3·484	3·761	4·029	4·278	4·528
	Q	2611·5	3383·3	4236·5	5153·5	6144·2	7188·1	8313·4
	C	0·789	0·811	0·831	0·847	0·862	0·874	0·887
0·4	V	2·709	3·003	3·289	3·550	3·812	4·038	4·274
	Q	2462·5	3189·9	3999·4	4864·4	5813·3	6784·8	7847·1
	C	0·789	0·811	0·832	0·848	0·863	0·875	0·888
0·35	V	2·534	2·809	3·076	3·321	3·561	3·782	4·002
	Q	2303·4	2988·9	3740·4	4550·6	5430·5	6354·7	7347·7
	C	0·789	0·811	0·832	0·848	0·864	0·876	0·889
0·3	V	2·342	2·601	2·851	3·078	3·301	3·505	3·714
	Q	2129·8	2762·9	3466·8	4217·6	5034·0	5889·3	6818·9
	C	0·788	0·811	0·833	0·849	0·865	0·877	0·891
0·25	V	2·139	2·377	2·604	2·814	3·017	3·208	3·398
	Q	1944·3	2525·0	3166·5	3855·9	4600·9	5390·2	6238·7
	C	0·788	0·812	0·833	0·850	0·866	0·879	0·893
0·2	V	1·910	2·126	2·331	2·522	2·705	2·878	3·050
	Q	1736·2	2258·3	2834·5	3455·8	4125·1	4835·7	5599·8
	C	0·787	0·812	0·834	0·852	0·868	0·882	0·896
0·15	V	1·652	1·841	2·021	2·190	2·351	2·504	2·655
	Q	1501·7	1955·6	2457·5	3000·8	3585·3	4207·3	4874·6
	C	0·786	0·812	0·835	0·854	0·871	0·886	0·901
0·10	V	1·348	1·506	1·659	1·799	1·933	2·063	2·188
	Q	1225·3	1599·7	2017·3	2465·1	2947·8	3466·3	4017·2
	C	0·785	0·813	0·839	0·859	0·877	0·894	0·909
0·05	V	·9481	1·067	1·180	1·286	1·390	1·488	1·584
	Q	861·8	1133·4	1434·9	1762·1	2119·7	2500·2	2908·2
	C	0·781	0·815	0·844	0·864	0·892	0·912	0·931

V and Q are always in feet

TABLE IX.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

width of 300 feet.

N=0·0225.

S per thousand.		Depths of water in feet. 7	8	9	10	12	14	16
0·5	V	5·252						
	Q	11286·5						
	C	0·906						
0·45	V	4·988						
	Q	10719·2						
	C	0·907						
0·4	V	4·708	5·112					
	Q	10117·5	12596·0					
	C	0·908	0·925					
0·35	V	4·409	4·793	5·158				
	Q	9474·9	11809·9	14344·4				
	C	0·909	0·927	0·943				
0·3	V	4·090	4·446	4·784	5·094			
	Q	8789·4	10950·9	13304·3	15791·7			
	C	0·911	0·929	0·945	0·957			
0·25	V	3·742	4·072	4·382	4·669	5·209		
	Q	8041·5	10033·4	12186·3	14473·9	19502·5		
	C	0·913	0·932	0·948	0·961	0·984		
0·2	V	3·362	3·662	3·940	4·202	4·692	5·138	5·546
	Q	7224·9	9023·2	10957·1	13026·2	17566·8	22586·6	28040·6
	C	0·917	0·937	0·953	0·967	0·991	1·010	1·025
0·15	V	2·934	3·194	3·444	3·673	4·113	4·503	4·869
	Q	6305·2	7870·0	9577·8	11386·3	15399·1	19795·2	24617·7
	C	0·924	0·944	0·962	0·976	1·003	1·022	1·039
0·1	V	2·427	2·645	2·859	3·055	3·425	3·762	4·075
	Q	5215·6	6517·3	7950·9	9470·5	12823·2	16537·7	20603·2
	C	0·936	0·957	0·978	0·994	1·023	1·046	1·065
0·05	V	1·736	1·938	2·102	2·258	2·548	2·814	3·063
	Q	3730·7	4775·2	5845·7	6999·8	9539·7	12370·3	15486·5
	C	0·947	0·992	1·017	1·039	1·076	1·106	1·132

and cubic feet per second.

TABLE X.

MEAN VELOCITIES OF DISCHARGE (V), IN FEET PER SECOND;

QUANTITIES DISCHARGED (Q), IN CUBIC FEET PER SECOND;

AND COEFFICIENTS (C) OF MEAN VELOCITY.

FOR CANALS OF TRAPEZOIDAL SECTION, WITH SIDE SLOPES OF ONE TO ONE, IN EARTH, IN CLASS III., IN GOOD AVERAGE ORDER AND REGIMEN; WHEN N, THE COEFFICIENT OF ROUGHNESS AND IRREGULARITY, =0·0250.

GENERAL FORMULA, $Q = A.V = A.C.100\sqrt{RS}$.

TABLE X.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-width of 2 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 0·5	0·75	1·	1·25	1·5	1·75	2·
5·0	V	1·763	2·275	2·708	3·090	3·431	3·747	4·055
	Q	2·204	4·686	8·124	12·55	18·01	24·58	32·44
	C	0·412	0·455	0·486	0·510	0·529	0·546	0·561
3·0	V	1·365	1·762	2·098	2·393	2·657	2·903	3·141
	Q	1·706	3·630	6·294	9·716	13·95	19·04	25·13
	C	0·412	0·455	0·486	0·510	0·529	0·546	0·561
2·0	V	1·115	1·439	1·713	1·953	2·169	2·370	2·565
	Q	1·394	2·964	5·139	7·929	11·39	15·55	20·52
	C	0·412	0·455	0·486	0·510	0·529	0·546	0·561
1·0	V	0·788	1·017	1·211	1·382	1·534	1·676	1·814
	Q	0·985	2·095	3·633	5·611	8·054	10·99	14·51
	C	0·412	0·455	0·486	0·510	0·529	0·546	0·561
0·8	V	0·703	0·906	1·079	1·235	1·367	1·493	1·619
	Q	0·879	1·866	3·237	5·014	7·177	9·794	12·95
	C	0·410	0·453	0·484	0·508	0·527	0·544	0·560
0·6	V	0·605	0·779	0·928	1·059	1·179	1·288	1·397
	Q	0·756	1·605	2·784	4·300	6·190	8·449	11·18
	C	0·408	0·450	0·481	0·505	0·525	0·542	0·558
0·5	V	0·549	0·708	0·846	0·966	1·075	1·174	1·273
	Q	0·686	1·458	2·538	3·922	5·644	7·701	10·38
	C	0·406	0·448	0·480	0·504	0·524	0·541	0·557
0·4	V	0·488	0·629	0·752	0·858	0·956	1·044	1·133
	Q	0·610	1·297	2·256	3·484	5·019	6·849	9·064
	C	0·403	0·445	0·477	0·501	0·521	0·538	0·554
0·2	V	0·333	0·431	0·515	0·593	0·661	0·722	0·785
	Q	0·416	0·888	1·545	2·408	3·470	4·736	6·280
	C	0·389	0·432	0·462	0·489	0·510	0·526	0·543
0·1	V	0·222	0·290	0·349	0·403	0·450	0·494	0·538
	Q	0·278	0·597	1·047	1·636	2·362	3·241	4·304
	C	0·367	0·410	0·443	0·470	0·491	0·509	0·526

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

For a Bed-width of 3 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 0·5	0·75	1·	1·5	2·	2·5	3·
5·0	V	1·882	2·457	2·928	3·713	4·385	4·957	5·488
	Q	3·293	6·904	11·71	25·06	43·85	68·16	98·78
	C	0·423	0·469	0·500	0·544	0·577	0·600	0·620
3·0	V	1·458	1·883	2·269	2·877	3·396	3·839	4·251
	Q	2·552	5·291	9·076	19·43	33·96	52·79	76·52
	C	0·423	0·469	0·500	0·544	0·577	0·600	0·620
2·0	V	1·190	1·554	1·852	2·348	2·773	3·135	3·471
	Q	2·083	4·367	7·408	15·85	27·73	43·11	62·48
	C	0·423	0·469	0·500	0·544	0·577	0·600	0·620
1·0	V	0·842	1·099	1·309	1·661	1·961	2·217	2·455
	Q	1·474	3·088	5·236	11·21	19·61	30·48	44·19
	C	0·423	0·469	0·500	0·544	0·577	0·600	0·620
0·8	V	0·749	0·979	1·167	1·480	1·751	1·980	2·192
	Q	1·311	2·751	4·668	9·990	17·51	27·23	39·46
	C	0·421	0·467	0·498	0·542	0·576	0·599	0·619
0·6	V	0·646	0·844	1·004	1·277	1·511	1·709	1·892
	Q	1·130	2·372	4·016	8·620	15·11	23·50	34·06
	C	0·419	0·465	0·495	0·540	0·574	0·597	0·617
0·5	V	0·587	0·767	0·915	1·164	1·380	1·557	1·724
	Q	1·027	2·155	3·660	7·857	13·80	21·41	31·03
	C	0·417	0·463	0·494	0·539	0·572	0·596	0·616
0·4	V	0·520	0·680	0·814	1·035	1·225	1·391	1·540
	Q	0·910	1·911	3·256	6·986	12·25	19·13	27·72
	C	0·413	0·459	0·491	0·536	0·570	0·595	0·615
0·2	V	0·355	0·467	0·560	0·716	0·850	0·966	1·073
	Q	0·614	1·312	2·240	4·833	8·500	13·28	19·31
	C	0·399	0·446	0·478	0·524	0·559	0·585	0·606
0·1	V	0·238	0·315	0·379	0·490	0·585	0·667	0·745
	Q	0·417	0·885	1·516	3·308	5·850	9·171	13·41
	C	0·378	0·425	0·458	0·507	0·544	0·571	0·595

and cubic feet per second.

TABLE X.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-width of 4 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 1·	1·5	2·	2·5	3·	3·5	4·
5·0	V	3·079	3·917	4·612	5·234	5·778	6·288	6·768
	Q	15·39	32·32	55·34	85·05	121·3	165·1	216·6
	C	0·509	0·554	0·585	0·611	0·630	0·647	0·662
3·0	V	2·385	3·034	3·573	4·055	4·476	4·871	5·242
	Q	11·93	25·03	42·88	65·89	94·00	127·9	167·7
	C	0·509	0·554	0·585	0·611	0·630	0·647	0·662
2·0	V	1·947	2·477	2·917	3·310	3·654	3·977	4·280
	Q	9·735	20·44	35·00	53·79	76·73	104·4	137·0
	C	0·509	0·554	0·585	0·611	0·630	0·647	0·662
1·0	V	1·377	1·752	2·063	2·341	2·584	2·812	3·027
	Q	6·885	14·45	24·76	38·04	54·26	73·82	96·86
	C	0·509	0·554	0·585	0·611	0·630	0·647	0·662
0·8	V	1·227	1·564	1·841	2·090	2·307	2·511	2·703
	Q	6·135	12·90	22·09	33·96	48·45	66·54	86·50
	C	0·507	0·553	0·584	0·610	0·629	0·646	0·661
0·6	V	1·056	1·347	1·589	1·805	1·995	2·172	2·337
	Q	5·280	11·11	19·07	29·33	41·90	57·02	74·78
	C	0·504	0·550	0·582	0·608	0·628	0·645	0·660
0·5	V	0·962	1·228	1·448	1·644	1·818	1·979	2·131
	Q	4·810	10·13	17·38	26·72	38·18	51·96	68·19
	C	0·503	0·549	0·581	0·607	0·627	0·644	0·659
0·4	V	0·855	1·092	1·291	1·468	1·621	1·768	1·902
	Q	4·275	9·009	15·49	23·86	34·04	46·41	60·86
	C	0·500	0·546	0·579	0·606	0·625	0·643	0·658
0·2	V	0·590	0·758	0·897	1·023	1·135	1·238	1·337
	Q	2·950	6·253	10·76	16·62	23·84	32·70	42·78
	C	0·488	0·536	0·569	0·597	0·619	0·637	0·654
0·1	V	0·401	0·518	0·619	0·708	0·787	0·861	0·934
	Q	2·005	4·273	7·428	11·51	16·53	22·60	29·89
	C	0·469	0·518	0·555	0·585	0·607	0·627	0·646

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

For a Bed-width of 5 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 1·	2·	2·5	3·	3·5	4·	5·
5·0	V	3·194	4·807	5·446	6·009	6·545	7·038	7·920
	Q	19·16	67·30	102·1	144·2	194·7	253·4	396·0
	C	0·516	0·593	0·618	0·637	0·655	0·670	0·693
3·0	V	2·474	3·723	4·218	4·655	5·070	5·572	6·134
	Q	14·84	52·12	79·09	111·7	150·8	200·6	306·7
	C	0·516	0·593	0·618	0·637	0·655	0·670	0·693
2·0	V	2·020	3·040	3·444	3·801	4·140	4·451	5·009
	Q	12·12	42·56	64·58	91·22	123·2	160·2	250·2
	C	0·516	0·593	0·618	0·637	0·655	0·670	0·693
1·0	V	1·428	2·150	2·436	2·688	2·927	3·148	3·542
	Q	8·568	30·10	45·68	64·51	87·08	113·3	177·1
	C	0·516	0·593	0·618	0·637	0·655	0·670	0·693
0·8	V	1·272	1·919	2·174	2·400	2·614	2·815	3·168
	Q	7·632	26·87	39·76	57·60	77·77	101·3	158·4
	C	0·514	0·592	0·617	0·636	0·654	0·670	0·693
0·6	V	1·096	1·660	1·880	2·075	2·260	2·434	2·740
	Q	6·576	23·24	35·25	49·80	67·24	87·62	137·0
	C	0·511	0·591	0·616	0·635	0·653	0·669	0·692
0·5	V	0·996	1·512	1·714	1·891	2·060	2·219	2·501
	Q	5·976	21·17	32·14	45·38	61·29	79·88	125·1
	C	0·509	0·590	0·615	0·634	0·652	0·668	0·692
0·4	V	0·886	1·350	1·530	1·689	1·840	1·982	2·233
	Q	5·316	18·90	28·69	40·54	54·74	71·35	111·7
	C	0·506	0·589	0·614	0·633	0·651	0·667	0·691
0·2	V	0·612	0·939	1·066	1·183	1·291	1·393	1·575
	Q	3·672	13·15	19·99	28·39	38·41	50·15	78·75
	C	0·495	0·579	0·605	0·627	0·646	0·663	0·689
0·1	V	0·417	0·646	0·739	0·822	0·900	0·975	1·105
	Q	2·502	9·044	13·86	19·73	26·78	35·10	55·25
	C	0·477	0·564	0·593	0·616	0·637	0·656	0·684

and cubic feet per second.

TABLE X.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-width of 6 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 1·	2·	2·5	3·	3·5	4·	5·
5·0	V	3·287	4·980	5·645	6·227	6·768	7·265	8·157
	Q	23·01	79·68	120·0	168·1	225·0	290·6	448·6
	C	0·522	0·601	0·626	0·645	0·662	0·676	0·699
3·0	V	2·546	3·857	4·372	4·823	5·241	5·628	6·327
	Q	18·82	61·71	92·91	130·2	174·3	225·1	348·0
	C	0·522	0·601	0·626	0·645	0·662	0·676	0·699
2·0	V	2·079	3·149	3·570	3·938	4·280	4·596	5·166
	Q	14·55	50·38	75·86	106·3	142·3	183·8	284·1
	C	0·522	0·601	0·626	0·645	0·662	0·676	0·699
1·0	V	1·470	2·227	2·524	2·784	3·027	3·250	3·653
	Q	10·29	35·63	53·64	75·17	100·6	130·0	200·9
	C	0·522	0·601	0·626	0·645	0·662	0·676	0·699
0·8	V	1·310	1·988	2·254	2·486	2·703	2·907	3·267
	Q	9·170	31·81	47·90	67·12	89·88	116·3	179·7
	C	0·520	0·600	0·625	0·644	0·661	0·676	0·699
0·6	V	1·128	1·719	1·946	2·150	2·337	2·514	2·830
	Q	7·896	27·50	41·35	58·05	77·71	100·6	155·7
	C	0·517	0·599	0·623	0·643	0·660	0·675	0·699
0·5	V	1·026	1·567	1·773	1·960	2·131	2·291	2·579
	Q	7·182	25·07	37·68	50·96	70·86	91·64	141·8
	C	0·515	0·598	0·622	0·642	0·659	0·674	0·698
0·4	V	0·912	1·397	1·584	1·750	1·902	2·046	2·307
	Q	6·384	22·35	33·66	45·50	63·24	81·84	126·9
	C	0·512	0·596	0·621	0·641	0·658	0·673	0·698
0·2	V	0·631	0·974	1·105	1·226	1·337	1·441	1·627
	Q	4·417	15·58	23·48	33·10	44·46	57·64	89·49
	C	0·501	0·588	0·613	0·635	0·654	0·670	0·696
0·1	V	0·430	0·673	0·763	0·853	0·934	1·008	1·143
	Q	3·010	10·77	16·21	23·03	31·06	40·32	62·87
	C	0·482	0·574	0·602	0·625	0·646	0·663	0·692

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

Trapezoidal Section, with Side Slopes of One to One.

For a Bed-width of 8 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 1·	2·	2·5	3·	3·5	4·	5·
5·0	V	3·403	5·228	5·917	6·553	7·114	7·649	8·590
	Q	30·63	104·6	155·3	216·2	286·3	367·2	558·4
	C	0·528	0·611	0·634	0·655	0·671	0·686	0·709
3·0	V	2·636	4·049	4·583	5·076	5·512	5·924	6·654
	Q	23·72	80·98	120·3	167·5	221·9	284·4	432·5
	C	0·528	0·611	0·634	0·655	0·671	0·686	0·709
2·0	V	2·153	3·306	3·743	4·145	4·500	4·837	5·433
	Q	19·38	66·12	98·25	136·8	181·1	232·2	353·1
	C	0·528	0·611	0·634	0·655	0·671	0·686	0·709
1·0	V	1·522	2·338	2·646	2·930	3·182	3·420	3·841
	Q	13·70	46·76	69·46	96·69	128·1	164·2	249·7
	C	0·528	0·611	0·634	0·655	0·671	0·686	0·709
0·8	V	1·356	2·091	2·364	2·617	2·846	3·055	3·436
	Q	12·20	41·82	62·06	86·36	114·6	146·6	223·3
	C	0·526	0·610	0·633	0·654	0·671	0·685	0·709
0·6	V	1·170	1·802	2·043	2·263	2·461	2·642	2·976
	Q	10·53	36·04	53·63	74·68	99·06	126·8	193·4
	C	0·524	0·608	0·632	0·653	0·670	0·684	0·709
0·5	V	1·064	1·643	1·862	2·063	2·247	2·412	2·716
	Q	9·576	32·86	48·88	68·08	90·44	115·8	176·5
	C	0·522	0·607	0·631	0·652	0·670	0·684	0·709
0·4	V	0·946	1·467	1·663	1·842	2·006	2·153	2·426
	Q	8·514	29·34	43·65	60·79	80·74	103·3	157·7
	C	0·519	0·606	0·630	0·651	0·669	0·683	0·708
0·2	V	0·655	1·021	1·166	1·293	1·410	1·519	1·713
	Q	5·895	20·42	30·61	42·67	56·75	72·91	111·3
	C	0·508	0·597	0·624	0·646	0·665	0·681	0·707
0·1	V	0·446	0·707	0·810	0·901	0·985	1·064	1·209
	Q	4·014	14·14	21·26	29·73	39·65	51·07	78·59
	C	0·489	0·584	0·614	0·637	0·657	0·675	0·706

and cubic feet per second.

TABLE X.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-width of 10 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 1·	2·	3·	3·5	4·	4·5	5·
2·0	V	2·198	3·411	4·307	4·687	5·032	5·358	5·652
	Q	24·18	81·86	168·0	221·5	281·8	349·6	423·9
	C	0·531	0·616	0·663	0·680	0·694	0·707	0·717
1·5	V	1·905	2·954	3·730	4·058	4·358	4·639	4·894
	Q	20·96	70·90	145·5	191·7	244·0	302·7	367·0
	C	0·531	0·616	0·663	0·680	0·694	0·707	0·717
1·0	V	1·555	2·412	3·045	3·314	3·557	3·788	3·997
	Q	17·11	57·89	118·8	156·6	199·2	247·2	299·7
	C	0·531	0·616	0·663	0·680	0·694	0·707	0·717
0·8	V	1·389	2·154	2·724	2·964	3·182	3·389	3·574
	Q	15·28	51·70	106·2	140·0	178·2	221·1	268·1
	C	0·530	0·615	0·663	0·680	0·694	0·707	0·717
0·6	V	1·197	1·862	2·355	2·563	2·752	2·934	3·096
	Q	13·17	44·69	91·84	121·1	154·1	191·4	232·2
	C	0·528	0·614	0·662	0·679	0·693	0·707	0·717
0·4	V	0·969	1·515	1·917	2·090	2·247	2·392	2·527
	Q	10·66	36·36	74·76	98·75	125·8	156·1	189·5
	C	0·523	0·612	0·660	0·678	0·693	0·706	0·717
0·3	V	0·831	1·306	1·656	1·807	1·943	2·072	2·186
	Q	9·141	31·34	64·58	85·38	104·8	135·2	164·0
	C	0·518	0·609	0·658	0·677	0·692	0·706	0·716
0·2	V	0·669	1·058	1·345	1·469	1·584	1·689	1·784
	Q	7·359	25·39	52·46	69·41	88·70	110·2	133·8
	C	0·511	0·604	0·655	0·674	0·691	0·705	0·716
0·1	V	0·457	0·732	0·941	1·031	1·112	1·187	1·262
	Q	5·027	17·57	36·70	48·71	62·27	77·45	94·65
	C	0·493	0·591	0·648	0·669	0·686	0·701	0·716
0·05	V	0·307	0·501	0·652	0·719	0·779	0·835	0·890
	Q	3·377	12·02	25·43	33·97	43·64	54·48	66·75
	C	0·469	0·573	0·635	0·660	0·680	0·697	0·714

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

For a Bed-width of 12 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 1·	2·	3·	3·5	4·	4·5	5·
2·0	V	2·241	3·503	4·441	4·828	5·186	5·518	5·831
	Q	29·13	98·08	199·8	261·9	331·9	409·7	495·6
	C	0·535	0·622	0·670	0·686	0·700	0·712	0·723
1·5	V	1·940	3·033	3·846	4·181	4·491	4·779	5·049
	Q	25·22	84·92	173·1	226·8	287·4	354·8	429·2
	C	0·535	0·622	0·670	0·686	0·700	0·712	0·723
1·0	V	1·584	2·477	3·140	3·414	3·667	3·902	4·123
	Q	20·59	69·36	141·3	185·2	234·7	289·7	350·5
	C	0·535	0·622	0·670	0·686	0·700	0·712	0·723
0·8	V	1·415	2·212	2·809	3·053	3·280	3·490	3·688
	Q	18·40	61·94	126·4	165·6	209·9	259·1	313·5
	C	0·534	0·621	0·670	0·686	0·700	0·712	0·723
0·6	V	1·220	1·896	2·429	2·641	2·837	3·022	3·193
	Q	15·86	53·09	109·3	143·3	181·6	224·4	271·4
	C	0·532	0·620	0·669	0·685	0·699	0·712	0·723
0·4	V	0·987	1·557	1·977	2·153	2·316	2·464	2·608
	Q	12·83	43·60	88·97	116·8	148·2	183·0	221·7
	C	0·527	0·618	0·667	0·684	0·699	0·711	0·723
0·3	V	0·848	1·341	1·707	1·862	2·003	2·134	2·258
	Q	11·02	37·55	76·82	101·0	128·2	158·4	191·9
	C	0·523	0·615	0·665	0·683	0·698	0·711	0·723
0·2	V	0·683	1·085	1·390	1·515	1·631	1·740	1·844
	Q	8·879	30·38	62·55	82·19	104·4	129·2	156·7
	C	0·516	0·609	0·663	0·681	0·696	0·710	0·723
0·1	V	0·466	0·752	0·972	1·029	1·149	1·229	1·304
	Q	6·058	21·06	43·74	55·82	73·54	91·25	110·8
	C	0·497	0·597	0·656	0·675	0·693	0·709	0·723
0·05	V	0·313	0·516	0·675	0·743	0·807	0·865	0·922
	Q	4·069	14·45	30·38	40·31	51·65	64·23	78·47
	C	0·472	0·580	0·644	0·668	0·689	0·706	0·723

and cubic feet per second.

TABLE X.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-width of 14 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 1	2	3	4	5	6	7
2·0	V	2·271	3·560	4·533	5·318	5·982	6·567	7·107
	Q	34·06	113·9	231·2	382·9	568·3	788·0	1044·7
	C	0·538	0·624	0·673	0·705	0·728	0·746	0·762
1·5	V	1·966	3·084	3·926	4·605	5·180	5·687	6·155
	Q	2949·	98·68	200·2	331·6	492·1	682·4	904·8
	C	0·538	0·624	0·673	0·705	0·728	0·746	0·762
1·0	V	1·606	2·518	3·205	3·760	4·230	4·644	5·025
	Q	24·09	80·58	163·4	270·7	401·8	557·3	738·7
	C	0·538	0·624	0·673	0·705	0·728	0·746	0·762
0·8	V	1·432	2·248	2·866	3·363	3·783	4·154	4·622
	Q	21·48	71·94	146·2	242·1	359·4	498·5	679·4
	C	0·536	0·623	0·673	0·705	0·728	0·746	0·762
0·6	V	1·237	1·941	2·479	2·909	3·277	3·602	3·898
	Q	18·55	62·11	126·4	209·4	311·3	432·2	573·0
	C	0·535	0·621	0·672	0·704	0·728	0·747	0·763
0·4	V	1·001	1·580	2·018	2·371	2·675	2·945	3·282
	Q	15·01	50·56	102·9	170·7	254·1	353·4	482·4
	C	0·530	0·619	0·670	0·703	0·728	0·748	0·765
0·3	V	·8600	1·361	1·745	2·053	2·316	2·554	2·767
	Q	12·90	43·55	88·99	147·8	220·0	306·5	406·7
	C	0·526	0·616	0·669	0·703	0·728	0·749	0·766
0·2	V	·6915	1·104	1·420	1·674	1·891	2·088	2·332
	Q	10·37	35·33	72·42	120·5	179·6	250·6	342·8
	C	0·518	0·612	0·667	0·702	0·728	0·750	0·769
0·1	V	·4720	·7668	·9940	1·180	1·340	1·484	1·660
	Q	7·080	24·54	50·69	84·96	127·3	178·1	244·0
	C	0·500	0·601	0·660	0·700	0·729	0·754	0·774
0·05	V	·3166	·5259	·6912	·8315	·9482	1·055	1·189
	Q	4·749	16·83	35·25	59·87	90·07	126·6	174·8
	C	0·474	0·583	0·649	0·697	0·730	0·758	0·784

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

For a Bed-width of 16 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 1	2	3	4	5	6	7
2·0	V	2·291	3·615	4·619	5·427	6·118	6·721	7·274
	Q	38·95	130·1	263·3	434·2	642·4	887·2	1171·1
	C	0·539	0·627	0·677	0·709	0·733	0·751	0·767
1·5	V	1·983	3·131	4·000	4·699	5·299	5·820	6·299
	Q	33·71	112·7	228·0	375·9	556·4	768·2	1014·1
	C	0·539	0·627	0·677	0·709	0·733	0·751	0·767
1·0	V	1·620	2·556	3·266	3·837	4·327	4·752	5·143
	Q	27·54	92·02	186·2	307·0	454·3	627·3	828·0
	C	0·539	0·627	0·677	0·709	0·733	0·751	0·767
0·8	V	1·443	2·286	2·922	3·432	3·869	4·251	4·600
	Q	24·53	82·30	166·5	274·6	406·2	561·1	740·6
	C	0·537	0·627	0·677	0·709	0·733	0·751	0·767
0·6	V	1·248	1·974	2·526	2·968	3·352	3·685	3·989
	Q	21·22	71·06	144·0	237·4	352·0	486·4	642·2
	C	0·536	0·625	0·676	0·708	0·733	0·752	0·768
0·4	V	1·009	1·606	2·057	2·420	2·736	3·013	3·265
	Q	17·15	57·82	117·2	193·6	287·3	397·7	525·7
	C	0·531	0·623	0·674	0·707	0·733	0·753	0·770
0·3	V	·8674	1·384	1·779	2·095	2·373	2·613	2·832
	Q	14·74	49·82	101·4	167·6	249·2	344·9	455·9
	C	0·527	0·620	0·673	0·707	0·734	0·754	0·771
0·2	V	·6975	1·113	1·448	1·708	1·938	2·137	2·318
	Q	11·86	40·07	82·54	136·6	203·5	282·1	373·2
	C	0·519	0·616	0·671	0·706	0·734	0·755	0·773
0·1	V	·4769	·7669	1·013	1·207	1·371	1·521	1·651
	Q	8·107	27·61	57·74	96·56	143·9	200·8	265·8
	C	0·502	0·595	0·664	0·705	0·735	0·760	0·779
0·05	V	·3205	·5362	·6730	·8506	·9728	1·084	1·186
	Q	5·448	19·30	38·36	68·05	102·1	143·1	190·9
	C	0·477	0·588	0·654	0·703	0·737	0·766	0·791

and cubic feet per second.

TABLE X.

Mean Velocities (V) of Discharge, Quantities dis-

For Canals in Earth, Class III., in good average order, of

For a Bed-width of 18 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 1	2	3	4	5	6	7
2·0	V	2·306	3·658	4·691	5·517	6·226	6·851	7·419
	Q	43·81	146·3	295·5	485·5	716·0	986·5	1298·3
	C	0·540	0·629	0·680	0·712	0·736	0·755	0·771
1·5	V	1·997	3·168	4·062	4·777	5·392	5·933	6·425
	Q	37·94	126·7	255·9	420·4	620·1	854·3	1124·4
	C	0·540	0·629	0·680	0·712	0·736	0·755	0·771
1·0	V	1·631	2·586	3·316	3·901	4·403	4·844	5·246
	Q	30·99	103·4	208·9	343·3	506·3	697·5	918·0
	C	0·540	0·629	0·680	0·712	0·736	0·755	0·771
0·8	V	1·456	2·313	2·966	3·489	3·938	4·333	4·692
	Q	27·66	92·52	186·8	307·0	452·9	623·9	821·1
	C	0·539	0·629	0·680	0·712	0·736	0·755	0·771
0·6	V	1·256	1·997	2·565	3·022	3·410	3·757	4·069
	Q	23·86	79·88	161·6	265·9	392·2	541·0	712·1
	C	0·537	0·627	0·679	0·712	0·736	0·756	0·772
0·4	V	1·018	1·623	2·085	2·464	2·788	3·076	3·330
	Q	19·34	64·92	131·3	216·8	320·6	442·9	582·7
	C	0·533	0·624	0·676	0·711	0·737	0·758	0·774
0·3	V	·8750	1·398	1·804	2·134	2·414	2·667	2·885
	Q	16·62	55·92	113·6	187·8	277·6	384·0	504·9
	C	0·529	0·621	0·675	0·711	0·737	0·759	0·774
0·2	V	·7033	1·136	1·468	1·739	1·974	2·181	2·364
	Q	13·66	45·44	92·48	153·0	227·0	314·1	413·7
	C	0·522	0·618	0·673	0·710	0·738	0·760	0·777
0·1	V	·4708	·7891	1·029	1·229	1·400	1·552	1·687
	Q	8·945	31·56	64·82	108·1	161·0	223·5	295·2
	C	0·493	0·607	0·667	0·709	0·740	0·765	0·784
0·05	V	·3233	·5437	·7172	·8673	·9941	1·108	1·213
	Q	6·143	21·75	45·18	76·32	114·3	159·5	212·3
	C	0·479	0·591	0·658	0·708	0·743	0·772	0·797

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

For a Bed-width of 20 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 1	2	3	4	5	6	7
2·0	V	2·325	3·696	4·754	5·599	6·341	6·964	7·543
	Q	48·82	162·6	328·0	537·5	792·6	1086·4	1423·7
	C	0·542	0·631	0·683	0·715	0·741	0·758	0·774
1·5	V	2·013	3·200	4·116	4·849	5·491	6·031	6·532
	Q	42·27	140·8	284·0	465·5	686·4	940·8	1234·5
	C	0·542	0·631	0·683	0·715	0·741	0·758	0·774
1·0	V	1·644	2·613	3·361	3·959	4·484	4·924	5·334
	Q	34·52	115·0	231·9	380·1	560·5	768·1	1008·1
	C	0·542	0·631	0·683	0·715	0·741	0·758	0·774
0·8	V	1·468	2·337	3·002	3·541	4·010	4·404	4·770
	Q	30·83	102·8	207·1	339·9	501·2	687·0	901·5
	C	0·541	0·631	0·682	0·715	0·741	0·758	0·774
0·6	V	1·266	2·018	2·596	3·067	3·478	3·819	4·131
	Q	26·59	88·79	179·1	294·4	434·7	595·8	780·7
	C	0·539	0·629	0·681	0·715	0·742	0·759	0·774
0·4	V	1·026	1·639	2·114	2·500	2·843	3·127	3·381
	Q	21·55	72·12	145·9	240·0	355·4	487·8	639·0
	C	0·535	0·626	0·679	0·714	0·743	0·761	0·776
0·3	V	·8820	1·413	1·827	2·165	2·466	2·711	2·932
	Q	18·52	62·17	126·1	207·8	308·2	422·9	554·1
	C	0·531	0·623	0·678	0·714	0·744	0·762	0·777
0·2	V	·7111	1·148	1·488	1·768	2·016	2·216	2·404
	Q	14·93	50·51	102·7	169·7	252·0	345·7	439·4
	C	0·524	0·620	0·676	0·714	0·745	0·763	0·780
0·1	V	·4843	·7978	1·042	1·250	1·430	1·578	1·717
	Q	10·17	35·10	71·90	120·0	178·7	246·2	324·5
	C	0·505	0·609	0·670	0·714	0·747	0·768	0·788
0·05	V	·3266	·5491	·7282	·8827	1·016	1·128	1·237
	Q	6·859	24·16	50·24	84·74	127·0	176·0	233·8
	C	0·481	0·593	0·662	0·713	0·751	0·777	0·803

and cubic feet per second.

TABLE X.

MEAN VELOCITIES (V) OF DISCHARGE, QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-width of 25 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 2	3	4	5	6	7	8
1·0	V	2·664	3·441	4·074	4·611	5·086	5·522	5·918
	Q	143·8	289·0	472·6	691·6	946·0	1236·9	1562·3
	C	0·635	0·687	0·721	0·745	0·764	0·781	0·795
0·8	V	2·384	3·073	3·644	4·124	4·549	4·940	5·293
	Q	128·7	258·1	422·7	618·6	846·1	1106·6	1397·3
	C	0·635	0·686	0·721	0·745	0·764	0·781	0·795
0·6	V	2·061	2·661	3·156	3·576	3·945	4·283	4·590
	Q	111·3	223·5	366·1	536·4	733·8	959·4	1211·7
	C	0·634	0·686	0·721	0·746	0·765	0·782	0·796
0·5	V	1·878	2·426	2·881	3·270	3·605	3·915	4·195
	Q	101·4	203·8	334·2	490·5	670·5	877·0	1107·5
	C	0·633	0·685	0·721	0·747	0·766	0·783	0·797
0·4	V	1·675	2·170	2·577	2·924	3·229	3·506	3·757
	Q	90·45	182·3	298·9	438·6	600·6	785·3	991·8
	C	0·631	0·685	0·721	0·747	0·767	0·784	0·798
0·3	V	1·446	1·877	2·231	2·536	2·800	3·044	3·266
	Q	78·08	157·7	258·8	380·4	520·8	681·8	862·2
	C	0·629	0·684	0·721	0·748	0·768	0·786	0·801
0·2	V	1·173	1·528	1·822	2·073	2·292	2·498	2·683
	Q	63·34	128·3	211·3	310·9	426·3	559·5	708·3
	C	0·625	0·682	0·721	0·749	0·770	0·790	0·806
0·15	V	1·011	1·319	1·578	1·798	1·993	2·172	2·332
	Q	54·59	110·8	183·0	269·7	370·7	486·5	615·6
	C	0·622	0·680	0·721	0·750	0·773	0·793	0·809
0·1	V	·8148	1·072	1·287	1·474	1·633	1·786	1·923
	Q	44·00	90·05	149·3	221·1	303·7	400·1	507·7
	C	0·614	0·677	0·720	0·753	0·776	0·799	0·817
0·05	V	·5606	·7493	·9101	1·048	1·157	1·287	1·390
	Q	30·27	62·94	105·6	157·2	215·2	288·1	367·0
	C	0·597	0·669	0·720	0·757	0·787	0·814	0·835

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

For a Bed-width of 30 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 2	3	4	5	6	7	8
1·0	V	2·703	3·505	4·153	4·723	5·222	5·661	6·072
	Q	173·0	347·0	564·8	826·5	1127·9	1466·2	1845·9
	C	0·638	0·691	0·724	0·750	0·770	0·785	0·799
0·8	V	2·500	3·135	3·715	4·224	4·671	5·070	5·438
	Q	160·0	310·4	505·2	739·2	1008·9	1313·1	1653·1
	C	0·638	0·691	0·724	0·750	0·770	0·786	0·800
0·6	V	2·091	2·711	3·217	3·585	4·050	4·396	4·715
	Q	133·8	268·4	437·5	627·4	874·8	1138·6	1433·4
	C	0·637	0·690	0·724	0·751	0·771	0·787	0·801
0·5	V	1·905	2·471	2·936	3·344	3·702	4·018	4·310
	Q	121·9	244·6	399·3	585·2	799·6	1040·7	1310·2
	C	0·636	0·689	0·724	0·751	0·772	0·788	0·802
0·4	V	1·757	2·210	2·627	2·994	3·315	3·599	3·865
	Q	112·4	218·8	357·3	523·9	716·0	932·1	1175·0
	C	0·634	0·689	0·724	0·752	0·773	0·789	0·804
0·3	V	1·466	1·911	2·275	2·542	2·875	3·124	3·355
	Q	93·82	189·2	309·4	444·8	621·0	809·1	1019·9
	C	0·632	0·688	0·724	0·753	0·774	0·791	0·806
0·2	V	1·231	1·556	1·858	2·123	2·357	2·564	2·756
	Q	78·78	154·0	252·7	371·5	509·1	664·1	837·8
	C	0·628	0·686	0·724	0·754	0·777	0·795	0·811
0·15	V	1·026	1·344	1·609	1·802	2·049	2·232	2·399
	Q	65·66	133·0	218·8	315·3	442·6	578·1	729·3
	C	0·625	0·684	0·724	0·755	0·780	0·799	0·815
0·10	V	·8565	1·092	1·313	1·511	1·682	1·836	1·981
	Q	54·82	108·1	178·6	264·4	363·3	475·5	602·2
	C	0·618	0·681	0·724	0·759	0·784	0·805	0·824
0·05	V	·5802	·7661	·9302	1·076	1·207	1·326	1·436
	Q	37·13	75·84	126·5	188·3	260·7	343·4	436·5
	C	0·592	0·675	0·725	0·764	0·796	0·822	0·845

and cubic feet per second.

TABLE X.

MEAN VELOCITIES (V) OF DISCHARGE, QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-width of 35 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 2	3	4	5	6	7	8
1·0	V	2·734	3·549	4·283	4·804	5·325	5·794	6·203
	Q	202·3	404·6	668·1	960·8	1310·0	1703·4	2185·8
	C	0·641	0·693	0·728	0·753	0·774	0·791	0·803
0·8	V	2·446	3·174	3·779	4·297	4·762	5·182	5·556
	Q	181·0	361·8	589·5	859·4	1171·4	1523·5	1912·5
	C	0·641	0·693	0·728	0·753	0·774	0·791	0·804
0·6	V	2·115	2·744	3·272	3·726	4·130	4·494	4·823
	Q	156·5	312·8	510·4	745·2	1015·9	1321·2	1661·1
	C	0·640	0·692	0·728	0·754	0·775	0·792	0·806
0·5	V	1·928	2·506	2·988	3·406	3·775	4·107	4·409
	Q	142·7	285·7	466·1	681·2	928·6	1207·4	1526·7
	C	0·639	0·692	0·728	0·755	0·776	0·793	0·807
0·4	V	1·719	2·241	2·672	3·050	3·381	3·678	3·953
	Q	127·2	255·5	416·8	610·0	831·7	1081·3	1363·8
	C	0·637	0·692	0·728	0·756	0·777	0·794	0·809
0·3	V	1·484	1·938	2·313	2·645	2·931	3·193	3·431
	Q	109·8	220·9	360·8	529·0	721·0	938·7	1181·4
	C	0·635	0·691	0·728	0·757	0·778	0·796	0·811
0·2	V	1·204	1·578	1·890	2·162	2·400	2·624	2·819
	Q	89·09	179·9	294·8	432·4	590·4	771·4	969·7
	C	0·631	0·689	0·728	0·758	0·780	0·801	0·816
0·15	V	1·036	1·362	1·636	1·875	2·089	2·281	2·456
	Q	76·66	155·3	255·2	375·0	513·9	670·6	844·9
	C	0·627	0·687	0·728	0·759	0·784	0·804	0·821
0·1	V	·8377	1·108	1·338	1·540	1·717	1·878	2·028
	Q	61·99	126·3	208·7	308·0	422·4	552·1	697·6
	C	0·621	0·684	0·729	0·763	0·789	0·811	0·830
0·05	V	·5772	·7774	·9475	1·099	1·234	1·358	1·472
	Q	42·71	88·62	147·8	219·8	303·6	399·2	506·4
	C	0·605	0·679	0·730	0·770	0·802	0·829	0·852

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

Trapezoidal Section, with Side Slopes of One to One.

For a Bed-width of 40 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 2	3	4	5	6	7	8
1·0	V	2·754	3·590	4·217	4·873	5·408	5·889	6·320
	Q	231·3	463·1	742·2	1096·4	1492·6	1937·5	2426·9
	C	0·642	0·696	0·720	0·756	0·777	0·794	0·807
0·8	V	2·463	3·211	3·772	4·358	4·831	5·267	5·659
	Q	206·9	414·2	663·9	980·5	1333·3	1732·8	2173·0
	C	0·642	0·696	0·720	0·756	0·776	0·794	0·808
0·6	V	2·130	2·777	3·267	3·778	4·189	4·567	4·913
	Q	178·9	358·2	575·0	850·0	1156·2	1502·5	1886·6
	C	0·641	0·695	0·720	0·757	0·777	0·795	0·810
0·5	V	1·941	2·535	2·982	3·454	3·828	4·175	4·490
	Q	163·0	327·0	524·8	777·1	1056·5	1373·6	1724·2
	C	0·640	0·695	0·720	0·758	0·778	0·796	0·811
0·4	V	1·731	2·267	2·667	3·094	3·429	3·739	4·027
	Q	145·4	292·4	469·4	696·1	946·4	1230·1	1546·4
	C	0·638	0·695	0·720	0·759	0·779	0·797	0·813
0·3	V	1·494	1·960	2·310	2·683	2·973	3·250	3·491
	Q	125·5	252·8	406·6	603·7	820·5	1069·2	1340·5
	C	0·636	0·694	0·720	0·760	0·780	0·800	0·814
0·2	V	1·215	1·596	1·889	2·194	2·440	2·670	2·872
	Q	102·1	205·9	332·5	493·6	673·4	878·4	1102·8
	C	0·633	0·692	0·721	0·761	0·784	0·805	0·820
0·15	V	1·045	1·379	1·636	1·905	2·122	2·320	2·502
	Q	87·78	177·9	287·9	428·6	585·7	763·3	960·8
	C	0·629	0·690	0·721	0·763	0·787	0·808	0·825
0·10	V	·8454	1·120	1·337	1·562	1·745	1·914	2·068
	Q	71·01	144·5	235·3	351·4	481·6	629·7	794·1
	C	0·623	0·687	0·722	0·766	0·793	0·816	0·835
0·05	V	·5827	·7870	·9484	1·116	1·253	1·384	1·502
	Q	48·95	101·5	166·9	251·1	345·8	455·3	576·8
	C	0·607	0·682	0·724	0·774	0·805	0·834	0·858

and cubic feet per second.

TABLE X.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-

N=0·0250.

S per thousand.		Depths of water in feet. 2	2·5	3·	3·5	4·	4·5	5
0·8	V	2·492	2·896	3·255	3·591	3·896	4·183	4·456
	Q	259·2	380·1	517·5	672·4	841·5	1025·8	1225·4
	C	0·645	0·675	0·698	0·718	0·734	0·748	0·761
0·6	V	2·156	2·504	2·819	3·110	3·375	3·628	3·864
	Q	224·2	328·6	448·2	582·3	729·0	889·8	1062·6
	C	0·644	0·674	0·698	0·718	0·734	0·749	0·762
0·5	V	1·965	2·282	2·570	2·838	3·085	3·312	3·528
	Q	204·4	299·5	408·6	531·4	666·3	812·3	970·2
	C	0·643	0·673	0·697	0·718	0·735	0·749	0·762
0·4	V	1·752	2·038	2·299	2·535	2·759	2·966	3·159
	Q	182·2	267·5	365·5	474·7	595·9	727·4	868·7
	C	0·641	0·672	0·697	0·717	0·735	0·750	0·763
0·3	V	1·512	1·763	1·988	2·195	2·393	2·572	2·740
	Q	157·2	231·4	316·1	411·0	516·9	630·8	753·5
	C	0·639	0·671	0·696	0·717	0·736	0·751	0·764
0·25	V	1·379	1·607	1·812	2·005	2·184	2·348	2·505
	Q	143·4	210·9	288·1	375·4	471·7	575·8	688·9
	C	0·638	0·670	0·695	6·717	0·736	0·751	0·765
0·2	V	1·229	1·435	1·618	1·792	1·953	2·103	2·243
	Q	127·8	188·4	257·3	335·5	421·8	515·8	616·8
	C	0·636	0·669	0·694	0·717	0·736	0·752	0·766
0·15	V	1·058	1·237	1·400	1·551	1·694	1·824	1·945
	Q	110·0	162·3	222·6	290·4	365·9	447·3	534·9
	C	0·632	0·666	0·693	0·716	0·737	0·753	0·767
0·1	V	·8544	1·004	1·138	1·266	1·383	1·497	1·597
	Q	88·86	131·8	180·9	237·0	298·7	367·1	439·2
	C	0·625	0·662	0·690	0·717	0·737	0·757	0·771
0·05	V	·5899	·7007	·7999	·8950	·9806	1·066	1·142
	Q	61·35	91·97	127·2	167·6	211·8	261·4	314·0
	C	0·610	0·653	0·686	0·716	0·739	0·762	0·780

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

Section, with Side Slopes of One in One.

width of 50 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 5·5	6·	6·5	7·	7·5	8·	9·
0·8	V	4·711						
	Q	1438·0						
	C	0·772						
0·6	V	4·085	4·290	4·496				
	Q	1246·9	1441·4	1651·1				
	C	0·773	0·782	0·792				
0·5	V	3·734	3·922	4·110	4·282	4·452		
	Q	1139·8	1317·8	1509·4	1708·5	1920·0		
	C	0·774	0·783	0·793	0·801	0·809		
0·4	V	3·344	3·512	3·680	3·840	3·991	4·130	4·404
	Q	1020·7	1180·0	1351·5	1532·2	1721·1	1916·3	2338·5
	C	0·775	0·784	0·794	0·803	0·811	0·817	0·830
0·3	V	2·901	3·049	3·195	3·329	3·461	3·590	3·832
	Q	885·5	1024·5	1173·4	1328·3	1492·5	1665·8	2034·8
	C	0·776	0·786	0·796	0·804	0·812	0·820	0·834
0·25	V	2·651	2·787	2·925	3·047	3·167	3·285	3·507
	Q	809·2	936·4	1074·2	1215·7	1365·8	1524·2	1862·2
	C	0·777	0·787	0·798	0·806	0·814	0·822	0·836
0·2	V	2·374	2·503	2·626	2·735	2·847	2·953	3·152
	Q	724·7	841·0	964·4	1091·2	1227·8	1370·2	1673·7
	C	0·778	0·790	0·801	0·809	0·818	0·826	0·840
0·15	V	2·064	2·175	2·282	2·383	2·480	2·570	2·752
	Q	630·0	730·8	838·1	950·8	1069·5	1192·5	1461·3
	C	0·781	0·793	0·804	0·814	0·823	0·830	0·847
0·1	V	1·696	1·790	1·882	1·965	2·047	2·126	2·276
	Q	517·7	601·4	691·2	784·0	882·8	986·5	1208·5
	C	0·786	0·799	0·812	0·822	0·832	0·841	0·858
0.05	V	1·219	1·289	1·359	1·422	1·487	1·547	1·660
	Q	372·1	433·1	499·1	567·4	641·3	717·8	881·5
	C	0·799	0·814	0·829	0·841	0·854	0·865	0·885

and cubic feet per second.

TABLE X.

MEAN VELOCITIES, OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-

N=0·0250.

S per thousand.		Depths of water in feet. 2·	2·5	3·	3·5	4·	4·5	5·
0·8	V	2·511	2·923	3·294	3·632	3·949	4·243	4·524
	Q	311·4	456·7	622·6	807·2	1010·9	1231·5	1470·3
	C	0·646	0·677	0·701	0·720	0·737	0·751	0·764
0·6	V	2·171	2·521	2·852	3·145	3·420	3·675	3·918
	Q	269·2	393·9	539·0	699·0	875·5	1066·7	1273·3
	C	0·645	0·676	0·701	0·720	0·737	0·751	0·764
0·5	V	1·979	2·304	2·600	2·871	3·123	3·355	3·582
	Q	245·4	360·0	491·4	638·1	799·5	973·8	1164·1
	C	0·644	0·675	0·700	0·720	0·737	0·751	0·765
0·4	V	1·764	2·058	2·316	2·568	2·782	3·004	3·208
	Q	218·7	321·6	437·7	570·7	712·2	871·9	1042·6
	C	0·642	0·674	0·700	0·720	0·737	0·752	0·766
0·3	V	1·523	1·779	2·011	2·224	2·422	2·605	2·781
	Q	188·8	278·0	380·1	494·3	620·0	756·1	903·8
	C	0·640	0·673	0·699	0·720	0·738	0·753	0·767
0·25	V	1·388	1·621	1·834	2·030	2·211	2·382	2·543
	Q	172·1	253·3	346·6	451·2	566·0	691·4	826·5
	C	0·639	0·672	0·698	0·720	0·738	0·754	0·768
0·2	V	1·238	1·449	1·638	1·816	1·980	2·133	2·277
	Q	153·5	226·4	309·6	403·6	506·9	619·1	740·0
	C	0·637	0·671	0·697	0·720	0·739	0·755	0·769
0·15	V	1·065	1·246	1·416	1·572	1·717	1·850	1·978
	Q	132·1	194·7	267·6	349·4	439·5	537·0	642·8
	C	0·633	0·668	0·696	0·720	0·740	0·756	0·771
0·1	V	·8614	1·015	1·153	1·283	1·404	1·514	1·623
	Q	106·8	158·6	217·9	285·1	359·4	439·4	527·5
	C	0·627	0·665	0·694	0·719	0·741	0·758	0·775
0·05	V	·5949	·7074	·8107	·9054	·9970	1·081	1·162
	Q	73·77	110·5	153·2	201·2	255·2	313·8	377·6
	C	0·612	0·655	0·690	0·718	0·744	0·765	0·785

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY,

Trapezoidal Section, with Side Slopes of One to One.

width of 60 feet.

N=0·0250.

S per thousand.		Depths of water in feet.						
		5·5	6·	6·5	7·	7·5	8·	9·
0·8	V	4·786						
	Q	1724·1						
	C	0·775						
0·6	V	4·151	4·367	4·573				
	Q	1495·4	1729·3	1976·7				
	C	0·776	0·786	0·795				
0·5	V	3·794	3·992	4·180	4·364	4·539		
	Q	1366·8	1580·8	1806·8	2046·7	2297·9		
	C	0·777	0·787	0·796	0·805	0·813		
0·4	V	3·397	3·575	3·748	3·907	4·070	4·213	4·501
	Q	1223·8	1415·7	1620·1	1832·4	2060·4	2291·9	2795·1
	C	0·778	0·788	0·798	0·806	0·815	0·821	0·835
0·3	V	2·946	3·100	3·254	3·393	3·533	3·662	3·917
	Q	1061·3	1227·6	1406·5	1591·3	1788·6	1992·1	2432·4
	C	0·779	0·789	0·800	0·808	0·817	0·824	0·839
0·25	V	2·693	2·841	2·978	3·105	3·232	3·355	3·585
	Q	970·1	1125·0	1287·2	1456·2	1636·2	1825·1	2226·3
	C	0·780	0·792	0·802	0·810	0·819	0·827	0·841
0·2	V	2·415	2·547	2·673	2·787	2·906	3·016	3·221
	Q	870·0	1008·6	1155·4	1307·1	1471·2	1640·7	2000·2
	C	0·782	0·794	0·805	0·813	0·823	0·831	0·845
0·15	V	2·100	2·217	2·324	2·429	2·532	2·627	2·813
	Q	756·5	877·9	1004·5	1139·2	1281·8	1429·0	1746·9
	C	0·785	0·798	0·808	0·818	0·828	0·836	0·852
0·10	V	1·725	1·824	1·919	2·005	2·092	2·168	2·329
	Q	621·4	722·3	829·5	940·3	1059·1	1179·3	1446·3
	C	0·790	0·804	0·817	0·827	0·838	0·845	0·864
0·05	V	1·240	1·315	1·385	1·450	1·520	1·579	1·702
	Q	446·7	520·7	598·7	680·0	769·5	853·5	1056·9
	C	0·803	0·820	0·834	0·846	0·861	0·870	0·893

and cubic feet per second.

TABLE X.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-

N=0·0250.

S per thousand.		Depths of water in feet. 2·	2·5	3·	3·5	4·	4·5	5·
0·8	V	2·524	2·941	3·316	3·664	3·988	4·287	4·574
	Q	363·4	533·0	726·2	942·6	1180·4	1437·2	1715·2
	C	0·647	0·678	0·702	0·722	0·739	0·753	0·766
0·6	V	2·183	2·543	2·872	3·173	3·452	3·713	3·961
	Q	314·3	460·9	629·0	816·2	1021·8	1244·8	1485·4
	C	0·646	0·677	0·702	0·722	0·739	0·753	0·766
0·5	V	1·990	2·318	2·622	2·897	3·152	3·394	3·621
	Q	286·6	420·1	574·2	745·2	933·0	1137·8	1357·9
	C	0·645	0·676	0·702	0·722	0·739	0·754	0·767
0·4	V	1·774	2·070	2·345	2·541	2·820	3·036	3·243
	Q	255·4	375·2	513·5	653·7	834·7	1017·8	1216·1
	C	0·643	0·675	0·702	0·722	0·739	0·754	0·768
0·3	V	1·531	1·789	2·031	2·244	2·446	2·633	2·812
	Q	220·5	324·2	444·8	577·3	724·0	882·7	1054·5
	C	0·641	0·674	0·701	0·722	0·740	0·755	0·769
0·25	V	1·396	1·632	1·849	2·048	2·232	2·406	2·571
	Q	201·0	295·8	404·9	526·8	660·7	806·6	964·1
	C	0·640	0·673	0·700	0·722	0·740	0·756	0·770
0·2	V	1·245	1·457	1·651	1·832	1·999	2·155	2·302
	Q	179·3	264·1	361·6	471·3	591·7	722·5	863·2
	C	0·638	0·672	0·699	0·722	0·741	0·757	0·771
0·15	V	1·071	1·258	1·428	1·587	1·734	1·872	2·001
	Q	154·2	228·0	312·7	408·2	513·3	627·6	750·4
	C	0·634	0·670	0·698	0·722	0·742	0·759	0·774
0·1	V	·8666	1·022	1·163	1·271	1·418	1·534	1·643
	Q	124·8	185·2	254·7	327·0	419·7	514·3	616·1
	C	0·628	0·666	0·696	0·722	0·743	0·762	0·778
0·05	V	·5983	·7118	·8172	·9149	1·008	1·095	1·178
	Q	86·15	129·0	179·0	235·3	298·4	367·1	441·7
	C	0·613	0·656	0·692	0·721	0·747	0·769	0·789

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 70 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 5·5	6·	6·5	7·	7·5	8·	9·
0·8	V	4·841						
	Q	2010·2						
	C	0·777						
0·6	V	4·198	4·420					
	Q	1743·2	2015·5					
	C	0·778	0·788					
0·5	V	3·837	4·040	4·238	4·426			
	Q	1593·3	1842·2	2107·3	2385·6			
	C	0·779	0·789	0·799	0·808			
0·4	V	3·437	3·572	3·799	3·964	4·125	4·276	
	Q	1427·2	1628·8	1889·0	2136·6	2397·6	2668·2	
	C	0·780	0·780	0·801	0·809	0·817	0·824	
0·3	V	2·983	3·101	3·299	3·446	3·586	3·717	3·985
	Q	1238·7	1414·0	1640·4	1857·4	2084·4	2319·4	2833·3
	C	0·782	0·782	0·803	0·812	0·820	0·827	0·843
0·25	V	2·728	2·839	3·019	3·153	3·281	3·406	3·646
	Q	1132·8	1294·5	1501·2	1699·5	1907·1	2125·3	2592·3
	C	0·783	0·784	0·805	0·814	0·822	0·830	0·845
0·2	V	2·446	2·548	2·710	2·830	2·949	3·061	3·276
	Q	1015·7	1161·9	1374·5	1525·4	1714·1	1910·1	2329·2
	C	0·785	0·787	0·808	0·817	0·826	0·834	0·849
0·15	V	2·126	2·219	2·356	2·466	2·566	2·669	2·864
	Q	882·8	1011·9	1171·5	1329·2	1491·5	1665·4	2036·3
	C	0·788	0·791	0·811	0·822	0·830	0·840	0·857
0·10	V	1·747	1·848	1·945	2·036	2·121	2·206	2·371
	Q	725·4	842·7	967·1	1097·4	1232·8	1376·5	1685·8
	C	0·793	0·807	0·820	0·831	0·840	0·850	0·869
0·05	V	1·257	1·332	1·407	1·476	1·544	1·607	1·737
	Q	522·0	607·4	699·6	795·6	897·4	1002·8	1235·0
	C	0·807	0·823	0·839	0·852	0·865	0·876	0·900

and cubic feet per second.

TABLE X.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-

N=0·0250.

S per thousand.		Depths of water in feet. 2·	2·5	3·	3·5	4·	4·5	5·
0·8	V	2·536	2·956	3·340	3·692	4·015	4·325	4·615
	Q	415·9	609·7	831·7	1078·9	1349·0	1644·6	1961·4
	C	0·648	0·679	0·704	0·724	0·740	0·755	0·768
0·6	V	2·193	2·556	2·889	3·198	3·477	3·745	3·997
	Q	359·6	527·2	719·4	934·6	1168·3	1424·0	1698·7
	C	0·647	0·678	0·703	0·724	0·740	0·755	0·768
0·5	V	1·999	2·330	2·637	2·919	3·175	3·424	3·653
	Q	327·8	480·6	656·6	853·1	1066·8	1302·0	1552·5
	C	0·646	0·677	0·703	0·724	0·740	0·756	0·769
0·4	V	1·782	2·081	2·358	2·611	2·843	3·062	3·272
	Q	292·2	429·2	587·1	763·1	955·2	1164·3	1390·6
	C	0·644	0·676	0·703	0·724	0·741	0·756	0·770
0·3	V	1·519	1·799	2·039	2·261	2·466	2·655	2·841
	Q	249·1	371·0	507·7	660·8	828·6	1009·6	1207·4
	C	0·642	0·675	0·702	0·724	0·742	0·757	0·772
0·25	V	1·403	1·640	1·862	2·061	2·250	2·427	2·596
	Q	230·1	338·2	463·6	602·3	756·0	922·9	1103·3
	C	0·641	0·674	0·702	0·723	0·742	0·758	0·773
0·2	V	1·250	1·465	1·663	1·844	2·013	2·174	2·326
	Q	205·0	302·1	414·1	538·9	676·4	826·7	988·5
	C	0·639	0·673	0·701	0·723	0·743	0·759	0·774
0·15	V	1·076	1·265	1·438	1·597	1·748	1·888	2·019
	Q	176·5	260·9	358·1	466·7	587·3	717·9	858·1
	C	0·635	0·671	0·700	0·723	0·744	0·761	0·776
0·1	V	·8705	1·026	1·169	1·303	1·429	1·547	1·657
	Q	142·8	211·6	291·1	380·8	480·1	588·2	704·2
	C	0·629	0·667	0·697	0·723	0·745	0·764	0·780
0·05	V	·6011	·7166	·8231	·9218	1·016	1·104	1·190
	Q	98·58	147·8	204·9	269·4	341·4	419·8	505·7
	C	0·614	0·658	0·694	0·723	0·749	0·771	0·792

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One in One.

width of 80 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 5·5	6·	6·5	7·	7·5	8·	9·
0·8	V	4·887						
	Q	2298·1						
	C	0·779						
0·6	V	4·238	4·463					
	Q	1992·9	2302·9					
	C	0·780	0·790					
0·5	V	3·874	4·080	4·282	4·474			
	Q	1821·7	2105·3	2407·5	2724·7			
	C	0·781	0·791	0·801	0·810			
0·4	V	3·470	3·653	3·839	4·006	4·171	4·332	
	Q	1631·8	1884·9	2158·5	2439·6	2737·2	3049·7	
	C	0·782	0·792	0·803	0·811	0·819	0·827	
0·3	V	3·012	3·172	3·333	3·482	3·629	3·766	4·028
	Q	1416·4	1636·7	1874·0	2120·5	2381·5	2651·3	3226·4
	C	0·784	0·794	0·805	0·814	0·823	0·830	0·844
0·25	V	2·754	2·903	3·050	3·187	3·321	3·445	3·686
	Q	1295·1	1497·9	1714·9	1940·9	2179·4	2425·3	2952·5
	C	0·785	0·796	0·807	0·816	0·825	0·832	0·846
0·2	V	2·469	2·606	2·739	2·861	2·985	3·096	3·316
	Q	1161·0	1344·7	1540·0	1742·3	1958·9	2179·6	2656·1
	C	0·787	0·799	0·810	0·819	0·829	0·836	0·851
0·15	V	2·149	2·266	2·382	2·496	2·601	2·704	2·896
	Q	1010·6	1169·2	1339·3	1520·0	1706·9	1903·6	2319·7
	C	0·791	0·802	0·814	0·825	0·834	0·843	0·858
0·1	V	1·766	1·869	1·968	2·060	2·149	2·234	2·400
	Q	830·5	964·4	1106·5	1254·5	1410·3	1572·7	1922·4
	C	0·796	0·810	0·823	0·834	0·844	0·853	0·871
0·05	V	1·271	1·347	1·424	1·495	1·565	1·630	1·758
	Q	597·7	695·0	800·6	910·4	1027·0	1147·5	1408·1
	C	0·810	0·826	0·842	0·856	0·869	0·880	0·902

and cubic feet per second.

TABLE X.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-

N=0·0250.

S per thousand.		Depths of water in feet. 2·	2·5	3·	3·5	4·	4·5	5·
0·8	V	2·541	2·964	3·351	3·706	4·043	4·350	4·645
	Q	467·5	685·4	934·9	1212·8	1520·2	1849·8	2206·4
	C	0·648	0·679	0·704	0·724	0·742	0·756	0·769
0·6	V	2·198	2·563	2·902	3·209	3·501	3·767	4·023
	Q	404·4	592·7	809·6	1050·1	1316·4	1601·9	1910·9
	C	0·647	0·678	0·704	0·724	0·742	0·756	0·769
0·5	V	2·003	2·336	2·649	2·930	3·196	3·443	3·677
	Q	368·5	540·2	739·1	958·8	1201·7	1464·1	1746·6
	C	0·646	0·677	0·704	0·724	0·742	0·757	0·770
0·4	V	1·786	2·087	2·366	2·621	2·859	3·080	3·294
	Q	328·6	482·6	660·1	857·7	1075·0	1309·8	1564·6
	C	0·644	0·676	0·703	0·724	0·742	0·757	0·771
0·3	V	1·544	1·804	2·046	2·270	2·479	2·675	2·859
	Q	284·1	417·2	570·8	742·8	932·1	1137·5	1358·0
	C	0·643	0·675	0·702	0·724	0·743	0·759	0·773
0·25	V	1·408	1·644	1·868	2·072	2·263	2·445	2·614
	Q	259·1	380·2	521·2	678·1	850·9	1039·7	1241·6
	C	0·642	0·674	0·702	0·724	0·743	0·760	0·774
0·2	V	1·253	1·469	1·671	1·853	2·027	2·189	2·341
	Q	230·5	339·7	466·2	606·4	762·1	930·9	1112·0
	C	0·639	0·673	0·702	0·724	0·744	0·761	0·775
0·15	V	1·079	1·268	1·445	1·605	1·758	1·901	2·035
	Q	198·5	293·2	403·1	525·2	661·0	808·4	966·6
	C	0·635	0·671	0·701	0·724	0·745	0·763	0·778
0·1	V	·8738	1·029	1·175	1·310	1·439	1·559	1·670
	Q	160·8	237·9	327·8	428·7	541·1	663·0	793·2
	C	0·630	0·667	0·698	0·724	0·747	0·766	0·782
0·05	V	·6027	·7185	·8282	·9267	1·024	1·114	1·199
	Q	110·9	166·1	231·1	303·3	385·0	473·7	569·5
	C	0·615	0·658	0·696	0·724	0·751	0·774	0·794

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 90 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 5·5	6·	6·5	7·	7·5	8·	9·
0·8	V	4·921						
	Q	2584·7						
	C	0·780						
0·6	V	4·267	4·506					
	Q	2241·2	2595·4					
	C	0·781	0·792					
0·5	V	3·901	4·120	4·320	4·515			
	Q	2049·0	2373·1	2709·7	3065·7			
	C	0·782	0·793	0·803	0·812			
0·4	V	3·493	3·689	3·874	4·049	4·210	4·374	4·764
	Q	1834·7	2124·9	2430·0	2749·3	3078·6	3429·2	4244·7
	C	0·783	0·794	0·805	0·814	0·821	0·829	0·844
0·3	V	3·033	3·203	3·367	3·514	3·659	3·801	4·075
	Q	1593·1	1844·9	2111·9	2386·0	2675·6	2980·0	3630·8
	C	0·785	0·796	0·808	0·816	0·824	0·832	0·847
0·25	V	2·776	2·932	3·081	3·216	3·353	3·479	3·729
	Q	1458·1	1688·8	1932·5	2183·6	2451·9	2727·5	3322·5
	C	0·787	0·798	0·810	0·818	0·827	0·834	0·849
0·2	V	2·489	2·631	2·767	2·891	3·013	3·126	3·350
	Q	1307·3	1515·4	1735·6	1963·0	2203·2	2450·8	2984·8
	C	0·789	0·801	0·813	0·822	0·831	0·838	0·853
0·15	V	2·166	2·290	2·407	2·518	2·626	2·730	2·930
	Q	1137·7	1319·0	1509·8	1709·7	1920·3	2140·3	2610·6
	C	0·793	0·805	0·817	0·827	0·836	0·845	0·861
0·10	V	1·780	1·888	1·985	2·079	2·166	2·258	2·428
	Q	934·9	1087·5	1245·1	1411·6	1583·9	1770·3	2163·3
	C	0·798	0·813	0·825	0·836	0·845	0·856	0·874
0·05	V	1·283	1·364	1·438	1·511	1·577	1·648	1·779
	Q	673·9	785·7	902·0	1026·0	1153·2	1292·0	1585·1
	C	0·813	0·830	0·845	0·859	0·870	0·883	0·906

and cubic feet per second.

TABLE X.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-

N=0·0250.

S per thousand.		Depths of water in feet. 2·	3·	3·5	4·	4·5	5·	5·5
0·5	V	2·007	2·657	2·943	3·208	3·457	3·702	3·923
	Q	409·4	821·0	1066·1	1334·5	1625·6	1943·5	2276·3
	C	0·646	0·704	0·725	0·742	0·757	0·772	0·783
0·45	V	1·906	2·520	2·792	3·047	3·279	3·513	3·721
	Q	388·8	778·7	1011·4	1267·5	1541·9	1844·3	2159·1
	C	0·646	0·704	0·725	0·743	0·757	0·772	0·783
0·4	V	1·792	2·373	2·632	2·872	3·096	3·316	3·513
	Q	365·6	733·2	953·4	1194·7	1455·9	1740·9	2038·4
	C	0·645	0·703	0·725	0·743	0·758	0·773	0·784
0·35	V	1·674	2·219	2·462	2·691	2·896	3·105	3·291
	Q	341·5	685·7	891·8	1119·4	1361·8	1630·1	1909·6
	C	0·644	0·703	0·725	0·744	0·758	0·774	0·785
0·3	V	1·548	2·055	2·279	2·491	2·684	2·879	3·050
	Q	315·8	635·0	825·6	1036·2	1262·1	1511·5	1769·8
	C	0·643	0·703	0·725	0·744	0·759	0·775	0·786
0·25	V	1·410	1·876	2·081	2·277	2·454	2·638	2·792
	Q	287·6	579·7	753·8	947·2	1154·0	1384·9	1620·0
	C	0·642	0·703	0·725	0·745	0·760	0·776	0·788
0·2	V	1·258	1·675	1·861	2·037	2·201	2·357	2·503
	Q	256·6	517·6	674·1	847·4	1035·0	1237·4	1452·4
	C	0·640	0·702	0·725	0·745	0·762	0·777	0·790
0·15	V	1·082	1·449	1·612	1·766	1·911	2·049	2·179
	Q	220·7	447·8	583·9	734·6	898·6	1075·7	1264·4
	C	0·636	0·701	0·725	0·746	0·764	0·780	0·794
0·1	V	·8771	1·180	1·317	1·446	1·567	1·682	1·793
	Q	178·9	364·6	477·1	601·5	736·8	883·0	1040·4
	C	0·631	0·699	0·725	0·748	0·767	0·784	0·800
0·05	V	·6055	·8315	·9322	1·028	1·119	1·207	1·290
	Q	123·5	256·9	337·7	427·6	526·2	633·7	748·5
	C	0·616	0·697	0·726	0·752	0·775	0·796	0·814

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 100 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 6·	6·5	7·	7·5	8·	9·	10·
	V	4·140	4·347	4·540				
0·5	Q	2633·0	3009·2	3400·5				
	C	0·794	0·804	0·812				
	V	3·927	4·130	4·315	4·492			
0·45	Q	2497·6	2859·0	3231·9	3621·7			
	C	0·794	0·805	0·813	0·821			
	V	3·707	3·899	4·071	4·240	4·406		
0·4	Q	2357·6	2699·1	3049·2	3418·5	3806·8		
	C	0·795	0·806	0·814	0·822	0·830		
	V	3·472	3·651	3·812	3·971	4·132	4·426	4·700
0·35	Q	2208·2	2527·4	2855·2	3201·6	3570·0	4341·9	5170·0
	C	0·796	0·807	0·815	0·823	0·832	0·846	0·858
	V	3·223	3·385	3·538	3·685	3·834	4·102	4·357
0·3	Q	2049·8	2343·3	2650·0	2971·0	3312·6	4024·1	4792·7
	C	0·798	0·808	0·817	0·825	0·834	0·847	0·859
	V	2·949	3·097	3·237	3·376	3·509	3·759	3·996
0·25	Q	1875·6	2143·9	2424·5	2721·9	3031·8	3687·6	4395·6
	C	0·800	0·810	0·819	0·828	0·836	0·850	0·863
	V	2·648	2·780	2·910	3·034	3·153	3·381	3·594
0·2	Q	1684·1	1924·4	2179·6	2446·2	2724·2	3316·8	3953·4
	C	0·803	0·813	0·823	0·832	0·840	0·855	0·868
	V	2·301	2·423	2·532	2·644	2·753	2·951	3·138
0·15	Q	1463·4	1677·3	1896·5	2131·7	2378·6	2894·9	3451·8
	C	0·806	0·818	0·827	0·837	0·847	0·862	0·875
	V	1·898	1·998	2·093	2·187	2·277	2·449	2·606
0·10	Q	1207·1	1383·1	1567·6	1763·3	1967·3	2402·5	2866·6
	C	0·814	0·826	0·837	0·848	0·858	0·876	0·890
	V	1·370	1·445	1·520	1·594	1·663	1·796	1·920
0·05	Q	871·3	1000·3	1138·5	1285·2	1436·8	1761·9	2112·0
	C	0·831	0·846	0·860	0·874	0·886	0·908	0·927

and cubic feet per second.

TABLE X.

Mean Velocities of Discharge (V), Quantities dis-

For Canals in Earth, Class III., in good average order, of

For a Bed-

N=0·0250.

S per thousand.		Depths of water in feet. 2·	3·	3·5	4·	4·5	5·	5·5
0·5	V	2·016	2·671	2·965	3·228	3·491	3·735	3·961
	Q	491·9	985·6	1281·6	1601·0	1955·8	2334·4	2734·1
	C	0·647	0·705	0·727	0·743	0·760	0·774	0·785
0·45	V	1·912	2·534	2·813	3·063	3·312	3·544	3·757
	Q	466·5	935·0	1215·9	1519·0	1855·5	2215·0	2593·3
	C	0·647	0·705	0·727	0·743	0·760	0·774	0·785
0·4	V	1·800	2·389	2·652	2·892	3·127	3·346	3·547
	Q	439·2	881·5	1146·3	1434·4	1751·9	2019·2	2448·3
	C	0·646	0·705	0·727	0·744	0·761	0·775	0·786
0·35	V	1·681	2·232	2·481	2·705	2·924	3·130	3·322
	Q	410·2	823·6	1072·4	1341·7	1638·2	1956·2	2293·0
	C	0·645	0·704	0·727	0·744	0·761	0·775	0·787
0·3	V	1·555	2·066	2·297	2·508	2·711	2·901	3·079
	Q	379·4	762·3	992·9	1243·9	1518·8	1813·1	2125·3
	C	0·644	0·704	0·727	0·745	0·762	0·776	0·788
0·25	V	1·409	1·887	2·097	2·292	2·478	2·652	2·819
	Q	343·8	696·3	906·4	1136·8	1388·3	1657·5	1945·8
	C	0·643	0·704	0·727	0·746	0·763	0·777	0·790
0·2	V	1·263	1·685	1·876	2·050	2·258	2·374	2·527
	Q	308·2	621·8	810·9	1016·8	1265·0	1483·7	1744·3
	C	0·641	0·703	0·727	0·746	0·764	0·778	0·792
0·15	V	1·087	1·457	1·624	1·780	1·927	2·068	2·200
	Q	265·2	537·6	702·0	882·9	1079·6	1292·5	1518·5
	C	0·637	0·702	0·727	0·748	0·766	0·782	0·796
0·10	V	·8796	1·188	1·328	1·458	1·582	1·697	1·810
	Q	214·6	438·4	574·0	723·2	886·3	1060·6	1249·3
	C	0·631	0·701	0·728	0·750	0·770	0·786	0·802
0·05	V	·6084	·8381	·9404	1·035	1·130	1·219	1·305
	Q	148·4	309·2	406·5	513·4	633·1	761·9	900·8
	C	0·617	0·699	0·729	0·753	0·778	0·799	0·818

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 120 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 6·	6·5	7·	7·5	8·	9·	10·
0·5	V	4·181	4·399	4·590				
	Q	3161·8	3617·1	4080·5				
	C	0·796	0·807	0·814				
0·45	V	3·972	4·178	4·360	4·548			
	Q	3002·8	3435·4	3876·0	4349·5			
	C	0·797	0·808	0·815	0·824			
0·4	V	3·750	3·939	4·116	4·294	4·464		
	Q	2835·0	3238·8	3659·1	4106·1	4571·1		
	C	0·798	0·808	0·816	0·825	0·833		
0·35	V	3·512	3·689	3·855	4·021	4·168	4·482	4·770
	Q	2655·1	3033·3	3427·1	3845·1	4268·0	5203·6	6201·0
	C	0·799	0·809	0·817	0·826	0·835	0·848	0·861
0·3	V	3·255	3·421	3·577	3·733	3·884	4·159	4·425
	Q	2460·8	2812·9	3179·9	3569·7	3977·2	4828·6	5752·5
	C	0·800	0·810	0·819	0·828	0·837	0·850	0·863
0·25	V	2·979	3·129	3·277	3·415	3·555	3·810	4·059
	Q	2252·1	2572·8	2913·2	3265·6	3640·3	4423·4	5276·7
	C	0·802	0·812	0·822	0·830	0·839	0·853	0·867
0·2	V	2·674	2·813	2·945	3·069	3·194	3·428	3·651
	Q	2021·5	2313·0	2618·1	2934·7	3270·6	3979·9	4746·3
	C	0·805	0·816	0·826	0·834	0·843	0·858	0·872
0·15	V	2·325	2·451	2·563	2·677	2·790	2·993	3·191
	Q	1757·7	2015·3	2278·5	2559·9	2856·9	3474·9	4148·3
	C	0·808	0·821	0·830	0·840	0·850	0·865	0·880
0·10	V	1·961	2·021	2·118	2·215	2·307	2·486	2·650
	Q	1482·5	1661·8	1882·9	2118·1	2362·4	2886·2	3445·0
	C	0·817	0·829	0·840	0·851	0·861	0·880	0·895
0·05	V	1·385	1·465	1·540	1·614	1·686	1·822	1·952
	Q	1047·1	1204·6	1369·0	1543·4	1726·5	2115·3	2537·6
	C	0·834	0·850	0·864	0·877	0·890	0·912	0·932

and cubic feet per second

TABLE X.

Mean Velocities of Discharge (V), Quantities dis-

For Canals in Earth, Class III., in good average order, of

For a Bed-

N=0·0250.

S per thousand.		Depths of water in feet. 2·	3·	3·5	4·	4·5	5·	5·5
0·5	V	2·023	2·680	2·984	3·250	3·511	3·758	3·991
	Q	574·5	1149·7	1498·7	1872·0	2283·0	2724·5	3187·8
	C	0·648	0·705	0·729	0·745	0·761	0·775	0·787
0·45	V	1·919	2·542	2·831	3·083	3·331	3·565	3·786
	Q	545·0	1090·5	1421·9	1775·8	2166·0	2584·6	3029·7
	C	0·648	0·705	0·729	0·745	0·761	0·775	0·787
0·4	V	1·807	2·396	2·669	2·911	3·145	3·365	3·574
	Q	513·2	1019·3	1340·5	1676·7	2045·0	2439·6	2860·1
	C	0·647	0·705	0·729	0·746	0·762	0·776	0·788
0·35	V	1·687	2·242	2·497	2·723	·2·941	3·148	3·348
	Q	479·1	961·8	1254·1	1568·4	1912·4	2282·3	2679·2
	C	0·646	0·705	0·729	0·746	0·762	0·776	0·789
0·3	V	1·560	2·072	2·311	2·524	2·727	2·918	3·103
	Q	443·0	888·9	1160·7	1453·8	1773·2	2115·5	2483·2
	C	0·645	0·704	0·729	0·747	0·763	0·777	0·790
0·25	V	1·412	1·892	2·110	2·304	2·490	2·668	2·840
	Q	401·0	811·7	1059·7	1327·1	1619·1	1934·3	2272·7
	C	0·644	0·704	0·729	0·747	0·763	0·778	0·792
0·2	V	1·268	1·690	1·887	2·064	2·229	2·389	2·546
	Q	360·1	725·0	947·7	1188·9	1449·4	1732·0	2037·4
	C	0·642	0·703	0·729	0·748	0·764	0·779	0·794
0·15	V	1·108	1·461	1·637	1·792	1·936	2·080	2·217
	Q	314·7	626·8	822·2	1032·2	1258·9	1508·0	1774·1
	C	0·638	0·702	0·730	0·750	0·766	0·783	0·798
0·1	V	·8969	1·193	1·336	1·467	2·049	1·707	1·823
	Q	254·7	511·8	671·0	845·0	1332·4	1237·6	1458·8
	C	0·632	0·702	0·730	0·752	0·769	0·787	0·804
0·05	V	·6106	·8414	·9466	1·041	1·135	1·227	1·315
	Q	173·4	361·0	475·4	599·6	738·0	889·6	1052·3
	C	0·618	0·700	0·731	0·755	0·778	0·800	0·820

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 140 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 6·	6·5	7·	7·5	8·	9·	10·
0·5	V	4·215	4·437	4·630				
	Q	3692·3	4225·1	4764·3				
	C	0·798	0·808	0·816				
0·45	V	4·004	4·209	4·398	4·590			
	Q	3507·5	4008·0	4525·5	5077·7			
	C	0·799	0·809	0·817	0·826			
0·4	V	3·779	3·972	4·151	4·333	4·506		
	Q	3310·4	3782·3	4271·4	4793·4	5335·1		
	C	0·800	0·810	0·818	0·827	0·835		
0·35	V	3·540	3·717	3·888	4·058	4·225	4·527	4·820
	Q	3101·0	3539·5	4000·7	4489·2	5002·4	6070·7	7230·0
	C	0·801	0·810	0·819	0·828	0·837	0·850	0·863
0·3	V	3·281	3·448	3·608	3·766	3·921	4·201	4·473
	Q	2874·1	4235·6	3712·6	4166·1	4642·5	5633·5	6709·5
	C	0·802	0·812	0·821	0·830	0·839	0·852	0·865
0·25	V	3·003	3·153	3·306	3·446	3·588	3·853	4·102
	Q	2630·6	3002·4	3401·9	3812·1	4248·2	5166·9	6153·0
	C	0·804	0·812	0·824	0·832	0·841	0·856	0·869
0·2	V	2·696	2·833	2·971	3·097	3·224	3·466	3·689
	Q	2361·7	2697·7	3057·2	3426·0	3817·2	4647·9	5533·5
	C	0·807	0·817	0·828	0·836	0·845	0·861	0·874
0·15	V	2·343	2·468	2·589	2·704	2·816	3·027	3·225
	Q	2052·5	2350·1	2664·1	2991·3	3334·1	4059·2	4837·5
	C	0·810	0·822	0·833	0·843	0·852	0·868	0·882
0·1	V	1·934	2·038	2·137	2·235	2·331	2·511	2·680
	Q	1694·2	1940·7	2199·0	2472·5	2759·9	3367·2	4020·0
	C	0·819	0·831	0·842	0·853	0·864	0·882	0·898
0·05	V	1·398	1·479	1·555	1·629	1·704	1·844	1·973
	Q	1224·6	1408·4	1600·1	1802·1	2017·5	2472·8	2959·5
	C	0·837	0·853	0·867	0·879	0·893	0·916	0·935

and cubic feet per second.

TABLE X.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-

N=0·0250.

S per thousand.		Depths of water in feet. 2·	3·	4·	4·5	5·	5·5	6·
0·5	V	2·026	2·689	3·268	3·527	3·777	4·012	4·239
	Q	656·4	1314·9	2143·8	2610·9	3116·0	3651·9	4222·0
	C	0·648	0·706	0·747	0·762	0·776	0·788	0·799
0·45	V	1·923	2·551	3·101	3·347	3·583	3·812	4·026
	Q	623·0	1247·4	2034·2	2477·6	2956·0	3469·9	4009·9
	C	0·648	0·706	0·747	0·762	0·776	0·789	0·800
0·4	V	1·810	2·405	2·924	3·159	3·382	3·594	3·800
	Q	586·4	1176·0	1918·1	2338·4	2790·1	3271·4	3784·8
	C	0·647	0·706	0·747	0·763	0·777	0·789	0·801
0·35	V	1·690	2·250	2·735	2·955	3·164	3·365	3·559
	Q	547·6	1100·2	1794·2	2187·4	2610·3	3063·0	3544·8
	C	0·646	0·706	0·747	0·763	0·777	0·790	0·802
0·3	V	1·562	2·080	2·535	2·740	2·933	3·120	3·299
	Q	506·1	1017·0	1663·0	2028·3	2419·7	2840·0	3285·8
	C	0·645	0·705	0·748	0·764	0·778	0·791	0·803
0·25	V	1·424	1·898	2·314	2·501	2·680	2·855	3·019
	Q	461·4	928·1	1517·9	1851·4	2211·0	2598·8	3006·9
	C	0·644	0·705	0·748	0·764	0·779	0·793	0·805
0·2	V	1·269	1·696	2·072	2·239	2·401	2·561	2·711
	Q	411·1	829·3	1359·2	1657·4	1980·8	2331·1	2700·1
	C	0·642	0·704	0·749	0·765	0·780	0·795	0·808
0·15	V	1·093	1·466	1·798	1·944	2·090	2·228	2·356
	Q	354·1	716·9	1179·5	1439·0	1724·2	2028·0	2346·6
	C	0·638	0·703	0·750	0·767	0·784	0·799	0·811
0·1	V	·8842	1·198	1·474	1·596	1·715	1·834	1·945
	Q	286·5	585·8	966·9	1181·4	1414·9	1669·4	1937·2
	C	0·632	0·703	0·753	0·771	0·788	0·805	0·820
0·05	V	·6112	·8447	1·046	1·142	1·234	1·323	1·408
	Q	198·0	413·1	686·2	845·4	1018·0	1204·3	1402·4
	C	0·618	0·701	0·756	0·780	0·802	0·821	0·839

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 160 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 6·5	7·	7·5	8·	9·	10·	12·
0·5	V	4·455						
	Q	4821·						
	C	0·809						
0·45	V	4·232	4·423					
	Q	4580·	5171·					
	C	0·810	0·818					
0·4	V	3·995	4·175	4·358	4·541			
	Q	4324·	4881·	5475·	6103·			
	C	0·811	0·819	0·828	0·837			
0·35	V	3·742	3·915	4·081	4·253	4·560		
	Q	4050·	4577·	5127·	5716·	6936·		
	C	0·812	0·821	0·829	0·838	0·851		
0·3	V	3·468	3·636	3·788	3·947	4·236	4·507	
	Q	3753·	4251·	4759·	5305·	6443·	7662·	
	C	0·813	0·823	0·831	0·840	0·854	0·866	
0·25	V	3·174	3·325	3·466	3·616	3·885	4·133	4·591
	Q	3435·	3887·	4354·	4860·	5909·	7026·	9476·
	C	0·815	0·825	0·833	0·843	0·858	0·870	0·890
0·2	V	2·849	2·988	3·115	3·249	3·495	3·723	4·142
	Q	3083·	3493·	3913·	4367·	5316·	6329·	8549·
	C	0·818	0·829	0·837	0·847	0·863	0·876	0·898
0·15	V	2·483	2·604	2·720	2·838	3·051	3·253	3·623
	Q	2687·	3044·	3417·	3814·	4641·	5530·	7478·
	C	0·823	0·834	0·844	0·854	0·870	0·884	0·907
0·10	V	2·049	2·151	2·250	2·349	2·532	2·704	3·021
	Q	2218·	2515·	2827·	3157·	3851·	4597·	6235·
	C	0·832	0·844	0·855	0·866	0·884	0·900	0·926
0·05	V	1·488	1·567	1·638	1·717	1·859	1·993	2·242
	Q	1610·	1832·	2058·	2308·	2828·	3388·	4628·
	C	0·854	0·869	0·880	0·895	0·918	0·938	0·972

and cubic feet per second.

TABLE X.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-

N=0·0250.

S per thousand.		Depths of water in feet. 2·	3·	4·	4·5	5·	5·5	6·
0·5	V	2·032	2·698	3·276	3·541	3·792	4·024	4·258
	Q	739·6	1481·	2411·	2940·	3508·	4106·	4752·
	C	0·649	0·707	0·747	0·763	0·777	0·788	0·800
0·45	V	1·928	2·559	3·108	3·359	3·597	3·823	4·039
	Q	701·8	1405·	2288·	2789·	3327·	3900·	4508·
	C	0·649	0·707	0·747	0·763	0·777	0·789	0·800
0·4	V	1·815	2·413	2·930	3·167	3·397	3·609	3·813
	Q	660·7	1325·	2157·	2629·	3142·	3682·	4255·
	C	0·648	0·707	0·747	0·763	0·778	0·790	0·801
0·35	V	1·695	2·254	2·741	2·967	3·177	3·380	3·571
	Q	617·0	1237·	2017·	2463·	2939·	3448·	3985·
	C	0·647	0·706	0·747	0·764	0·778	0·791	0·802
0·3	V	1·566	2·087	2·541	2·749	2·945	3·133	3·315
	Q	570·0	1146·	1870·	2282·	2724·	3196·	3700·
	C	0·646	0·706	0·748	0·765	0·779	0·792	0·804
0·25	V	1·428	1·905	2·319	2·511	2·692	2·867	3·030
	Q	519·8	1046·	1707·	2085·	2490·	2925·	3382·
	C	0·645	0·706	0·748	0·765	0·780	0·794	0·805
0·2	V	1·274	1·701	2·078	2·248	2·414	2·571	2·723
	Q	463·7	933·8	1529·	1866·	2233·	2623·	3039·
	C	0·643	0·705	0·749	0·766	0·782	0·796	0·809
0·15	V	1·096	1·471	1·801	1·952	2·098	2·238	2·367
	Q	398·9	807·6	1326·	1621·	1941·	2283·	2642·
	C	0·639	0·704	0·750	0·768	0·785	0·800	0·812
0·1	V	·8862	1·200	1·477	1·601	1·725	1·841	1·954
	Q	322·6	658·8	1087·	1329·	1596·	1878·	2181·
	C	0·633	0·703	0·753	0·771	0·790	0·806	0·821
0·05	V	·6134	·8461	1·050	1·146	1·240	1·327	1·414
	Q	223·3	464·5	772·8	951·5	1147·	1354·	1578·
	C	0·619	0·701	0·757	0·781	0·803	0·822	0·840

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 180 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 6·5	7·	7·5	8·	9·	10·	12·
0·5	V	4·483						
	Q	5435·						
	C	0·811						
0·45	V	4·258	4·447					
	Q	5162·	5821·					
	C	0·812	0·819					
0·4	V	4·019	4·198	4·378	4·561			
	Q	4872·	5495·	6157·	6860·			
	C	0·813	0·820	0·829	0·837			
0·35	V	3·765	3·936	4·100	4·276	4·592		
	Q	4564·	5152·	5766·	6431·	7811·		
	C	0·814	0·822	0·830	0·839	0·853		
0·3	V	3·489	3·653	3·806	3·969	4·261	4·540	
	Q	4230·	4782·	5352·	5969·	7248·	8626·	
	C	0·815	0·824	0·832	0·841	0·855	0·868	
0·25	V	3·193	3·343	3·482	3·635	3·908	4·164	4·634
	Q	3871·	4376·	4897·	5467·	6648·	7912·	10677·
	C	0·817	0·826	0·834	0·844	0·859	0·872	0·893
0·2	V	2·867	3·004	3·130	3·266	3·516	3·746	4·172
	Q	3476·	3932·	4402·	4912·	5981·	7117·	9612·
	C	0·820	0·830	0·838	0·848	0·864	0·877	0·899
0·15	V	2·500	2·618	2·733	2·852	3·069	3·274	3·653
	Q	3031·	3427·	3843·	4289·	5220·	6221·	8417·
	C	0·826	0·835	0·845	0·855	0·871	0·885	0·909
0·10	V	2·064	2·163	2·261	2·362	2·546	2·721	3·046
	Q	2502·	2831·	3180·	3552·	4331·	5170·	7018·
	C	0·835	0·845	0·856	0·867	0·885	0·901	0·928
0·05	V	1·500	1·576	1·646	1·728	1·872	2·008	2·262
	Q	1818·	2063·	2315·	2599·	3184·	3815·	5212·
	C	0·858	0·871	0·881	0·897	0·920	0·940	0·975

and cubic feet per second.

TABLE X.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-

N=0·0250.

S per thousand.		Depths of water in feet. 2·	3·	4·	4·5	5·	5·5	6·
0·5	V	2·034	2·701	3·282	3·549	3·801	4·040	4·275
	Q	821·7	1645·	2678·	3267·	3896·	4566·	5284·
	C	0·649	0·707	0·747	0·763	0·777	0·789	0·801
0·45	V	1·929	2·563	3·114	3·366	3·606	3·837	4·055
	Q	779·3	1561·	2541·	3098·	3696·	4337·	5012·
	C	0·649	0·707	0·747	0·763	0·777	0·790	0·801
0·4	V	1·816	2·416	2·936	3·177	3·404	3·617	3·828
	Q	733·7	1471·	2396·	2924·	3489·	4088·	4731·
	C	0·648	0·707	0·747	0·764	0·778	0·790	0·802
0·35	V	1·696	2·260	2·747	2·973	3·188	3·389	3·585
	Q	685·2	1376·	2242·	2736·	3268·	3830·	4431·
	C	0·647	0·707	0·747	0·764	0·779	0·791	0·803
0·3	V	1·568	2·093	2·546	2·756	2·952	3·141	3·328
	Q	633·5	1275·	2078·	2536·	3026·	3550·	4113·
	C	0·646	0·707	0·748	0·765	0·779	0·792	0·805
0·25	V	1·429	1·908	2·324	2·519	2·698	2·873	3·046
	Q	577·3	1162·	1896·	2318·	2765·	3247·	3765·
	C	0·645	0·706	0·748	0·766	0·780	0·794	0·807
0·2	V	1·274	1·706	2·081	2·256	2·419	2·581	2·734
	Q	514·7	1039·	1698·	2076·	2480·	2917·	3379·
	C	0·643	0·706	0·749	0·767	0·782	0·797	0·810
0·15	V	1·096	1·475	1·807	1·956	2·106	2·246	2·376
	Q	442·8	898·3	1475·	1800·	2159·	2539·	2937·
	C	0·639	0·705	0·751	0·768	0·786	0·801	0·813
0·10	V	·8875	1·230	1·480	1·606	1·731	1·848	1·962
	Q	358·5	732·6	1208·	1478·	1774·	2089·	2425·
	C	0·633	0·704	0·753	0·772	0·791	0·807	0·822
0·05	V	·6134	·8487	1·054	1·150	1·244	1·332	1·420
	Q	247·8	516·9	860·1	1058·	1275·	1506·	1755·
	C	0·619	0·702	0·758	0·782	0·804	0·823	0·841

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 200 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 6·5	7·	7·5	8·	9·	10·	12·
0·5	V	4·501						
	Q	6042·						
	C	0·812						
0·45	V	4·276	4·466					
	Q	5740·	6471·					
	C	0·813	0·820					
0·4	V	4·036	4·216	4·403	4·582			
	Q	5417·	6109·	6852·	7624·			
	C	0·814	0·821	0·830	0·838			
0·35	V	3·780	3·953	4·128	4·297	4·610		
	Q	5074·	5728·	6424·	7150·	8671·		
	C	0·815	0·823	0·832	0·840	0·853		
0·3	V	3·504	3·669	3·831	3·987	4·283	4·565	
	Q	4703·	5316·	5962·	6634·	8056·	9587·	
	C	0·816	0·825	0·834	0·842	0·856	0·869	
0·25	V	3·206	3·358	3·506	3·653	3·928	4·187	4·671
	Q	4303·	4866·	5456·	6079·	7389·	8793·	11883·
	C	0·818	0·827	0·836	0·845	0·860	0·873	0·896
0·2	V	2·878	3·016	3·151	3·283	3·533	3·766	4·201
	Q	3863·	4370·	4904·	5463·	6646·	7909·	10687·
	C	0·821	0·831	0·840	0·849	0·865	0·878	0·901
0·15	V	2·508	2·628	2·751	2·866	3·084	3·295	3·679
	Q	3366·	3708·	4281·	4769·	5801·	6920·	9359·
	C	0·826	0·836	0·847	0·856	0·872	0·887	0·911
0·10	V	2·070	2·172	2·276	2·373	2·562	2·739	3·066
	Q	2778·	3147·	3542·	3949·	4819·	5752·	7800·
	C	0·835	0·846	0·858	0·868	0·887	0·903	0·930
0·05	V	1·504	1·583	1·660	1·739	1·884	2·021	2·278
	Q	2019·	2294·	2583·	2894·	3544·	4244·	5795·
	C	0·858	0·872	0·885	0·899	0·922	0·942	0·977

and cubic feet per second.

TABLE X.

Mean Velocities of Discharge (V), Quantities dis-

For Canals in Earth, Class III., in good average order, of

For a Bed-

N=0·0250.

S per thousand.		Depths of water in feet. 2·	3·	4·	4·5	5·	5·5	6·
0·5	V	2·039	2·709	3·287	3·559	3·808	4·053	4·284
	Q	905·3	1812·	2942·	3596·	4284·	5027·	5809·
	C	0·650	0·708	0·747	0·764	0·777	0·790	0·801
0·45	V	1·934	2·570	3·119	3·377	3·671	3·845	4·069
	Q	858·7	1719·	2792·	3412·	4130·	4769·	5518·
	C	0·650	0·708	0·747	0·764	0·777	0·790	0·802
0·4	V	1·821	2·419	2·944	3·188	3·411	3·630	3·837
	Q	808·5	1618·	2635·	3221·	3837·	4502·	5203·
	C	0·649	0·707	0·748	0·765	0·778	0·791	0·802
0·35	V	1·700	2·263	2·754	2·981	3·195	3·400	3·593
	Q	754·8	1514·	2465·	3012·	3594·	4217·	4872·
	C	0·648	0·707	0·748	0·765	0·779	0·792	0·803
0·3	V	1·569	2·095	2·553	2·764	2·962	3·151	3·335
	Q	696·6	1402·	2285·	2792·	4457·	3908·	4522·
	C	0·646	0·707	0·749	0·766	0·780	0·793	0·805
0·25	V	1·431	1·913	2·331	2·526	2·707	2·884	3·052
	Q	635·4	1280·	2086·	2552·	4170·	3577·	4139·
	C	0·645	0·707	0·749	0·767	0·781	0·795	0·807
0·2	V	1·276	1·708	2·088	2·262	2·427	2·586	2·740
	Q	566·5	1143·	1869·	2285·	2731·	3207·	3715·
	C	0·643	0·706	0·750	0·768	0·783	0·797	0·810
0·15	V	1·099	1·478	1·810	1·960	2·110	2·248	2·385
	Q	487·9	988·8	1620·	1980·	2374·	2788·	3234·
	C	0·640	0·705	0·751	0·768	0·786	0·800	0·814
0·10	V	·8895	1·206	1·484	1·609	1·735	1·854	1·969
	Q	394·9	806·8	1328·	1626·	1952·	2299·	2670·
	C	0·634	0·705	0·754	0·772	0·791	0·808	0·823
0·05	V	·6150	·8506	1·055	1·153	1·246	1·336	1·425
	Q	273·1	569·0	844·2	1165·	1402·	1657·	1932·
	C	0·620	0·703	0·758	0·783	0·804	0·823	0·842

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 220 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 6·5	7·	7·5	8·	9·	10·	12·
0·5	V	4·512						
	Q	6643·						
	C	0·812						
0·45	V	4·286	4·483					
	Q	6310·	7124·					
	C	0·813	0·821					
0·4	V	4·045	4·232	4·420	4·601			
	Q	5955·	6725·	7542·	8392·			
	C	0·814	0·822	0·831	0·839			
0·35	V	3·790	3·963	4·145	4·313	4·630		
	Q	5580·	6297·	7072·	7867·	9542·		
	C	0·815	0·823	0·833	0·841	0·854		
0·3	V	3·513	3·679	3·847	4·003	4·301	4·587	
	Q	5172·	5846·	6564·	7302·	8864·	10550·	
	C	0·816	0·825	0·835	0·843	0·857	0·870	
0·25	V	3·214	3·371	3·520	3·668	3·944	4·206	4·696
	Q	4732·	5357·	6006·	6690·	8129·	9674·	13074·
	C	0·818	0·828	0·837	0·846	0·861	0·874	0·897
0·2	V	2·888	3·025	3·164	3·296	3·549	3·784	4·223
	Q	4252·	4807·	5399·	6012·	7325·	8703·	11757·
	C	0·822	0·831	0·841	0·850	0·866	0·879	0·902
0·15	V	2·517	2·635	2·762	2·879	3·098	3·310	3·698
	Q	370·6	4187·	4713·	5251·	6385·	7613·	10295·
	C	0·827	0·836	0·848	0·857	0·873	0·888	0·912
0·10	V	2·077	2·180	2·285	2·383	2·573	2·752	3·082
	Q	3058·	3464·	3899·	4347·	5304·	6330·	8580·
	C	0·836	0·847	0·859	0·869	0·888	0·904	0·931
0·05	V	1·507	1·589	1·668	1·745	1·891	2·030	2·292
	Q	2219·	2525·	2846·	3183·	3897·	4669·	6381·
	C	0·858	0·873	0·887	0·900	0·923	0·943	0·979

and cubic feet per second.

TABLE X.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-

N=0·0250.

S per thousand.		Depths of water in feet. 2·	3·	4·	4·5	5·	5·5	6·
0·5	V	2·040	2·712	3·292	3·564	3·814	4·065	4·298
	Q	987·4	1977·	3213·	3921·	4672·	5489·	6344·
	C	0·650	0·708	0·747	0·764	0·777	0·791	0·802
0·45	V	1·935	2·572	3·123	3·381	3·623	3·856	4·077
	Q	936·5	1875·	3048·	3720·	4438·	5207·	6018·
	C	0·650	0·708	0·748	0·764	0·778	0·791	0·802
0·4	V	1·822	2·426	2·949	3·192	3·420	3·641	3·849
	Q	831·8	1769·	2878·	3512·	4190·	4916·	5681·
	C	0·649	0·708	0·748	0·765	0·779	0·792	0·803
0·35	V	1·702	2·265	2·757	2·986	3·203	3·410	3·604
	Q	823·8	1651·	2691·	3285·	3924·	4604·	5320·
	C	0·648	0·707	0·748	0·765	0·780	0·793	0·804
0·3	V	1·570	2·097	2·556	2·768	2·970	3·161	3·346
	Q	760·0	1529·	2495·	3046·	3638·	4268·	4939·
	C	0·646	0·707	0·749	0·766	0·781	0·794	0·806
0·25	V	1·431	1·914	2·334	2·529	2·714	2·893	3·061
	Q	692·6	1395·	2278·	2783·	3325·	3906·	4518·
	C	0·645	0·707	0·749	0·767	0·782	0·796	0·808
0·2	V	1·275	1·710	2·090	2·266	2·434	2·594	2·749
	Q	617·1	1247·	2040·	2493·	2982·	3503·	4058·
	C	0·643	0·706	0·750	0·768	0·784	0·798	0·811
0·15	V	1·100	1·479	1·812	1·967	2·116	2·256	2·392
	Q	532·4	1078·	1769·	2164·	2592·	3046·	3531·
	C	0·640	0·705	0·751	0·770	0·787	0·801	0·815
0·10	V	·8901	1·208	1·486	1·613	1·739	1·860	1·975
	Q	430·8	880·6	1450·	1775·	2130·	2512·	2915·
	C	0·634	0·705	0·754	0·773	0·792	0·809	0·824
0·05	V	·6157	·8513	1·058	1·157	1·250	1·341	1·429
	Q	298·0	620·6	1033·	1273·	1531·	1811·	2109·
	C	0·620	0·703	0·759	0·784	0·805	0·825	0·843

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 240 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 6·5	7·	7·5	8·	9·	10·	12·
0·5	V	4·521						
	Q	7244·						
	C	0·812						
0·45	V	4·294	4·493					
	Q	6880·	7768·					
	C	0·813	0·821					
0·4	V	4·054	4·241	4·430				
	Q	6460·	7333·	8223·				
	C	0·814	0·822	0·831				
0·35	V	3·797	3·972	4·054	4·324	4·648		
	Q	6084·	6868·	7525·	8579·	10416·		
	C	0·815	0·823	0·833	0·841	0·855		
0·3	V	3·519	3·686	3·855	4·018	4·317	4·606	
	Q	5638·	6373·	7156·	7962·	9674·	11515·	
	C	0·816	0·825	0·835	0·843	0·858	0·871	
0·25	V	3·220	3·377	3·527	3·676	3·960	4·224	4·718
	Q	5159·	5839·	6547·	7293·	8874·	10560·	14267·
	C	0·818	0·828	0·837	0·846	0·862	0·875	0·898
0·2	V	2·894	3·035	3·171	3·304	3·562	3·800	4·243
	Q	4637·	5248·	5886·	6555·	7982·	9500·	12831·
	C	0·822	0·832	0·841	0·850	0·867	0·880	0·903
0·15	V	2·522	2·644	2·769	2·885	3·110	3·324	3·715
	Q	4041·	4572·	5140·	5724·	6970·	8310·	11234·
	C	0·827	0·837	0·848	0·857	0·874	0·889	0·913
0·10	V	2·082	2·188	2·293	2·389	2·582	2·763	3·097
	Q	3336·	3783·	4256·	4740·	5786·	6908·	9365·
	C	0·836	0·848	0·860	0·869	0·889	0·905	0·932
0·05	V	1·513	1·594	1·674	1·750	1·900	2·040	2·305
	Q	2424·	2756·	3107·	3472·	4258·	5100·	6970·
	C	0·859	0·874	0·888	0·900	0·924	0·945	0·981

and cubic feet per second.

TABLE X.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-

N=0·0250.

S per thousand.		Depths of water in feet. 3·	3·5	4·	4·5	5·	5·5	6·
0·5	V	2·714	3·017	3·299	3·569	3·825	4·071	4·224
	Q	2141·	2782·	3484·	4248·	5068·	5945·	6742·
	C	0·708	0·730	0·748	0·764	0·778	0·791	0·802
0·45	V	2·575	2·863	3·130	3·394	3·628	3·863	4·089
	Q	2032·	2640·	3305·	4040·	4807·	5641·	6526·
	C	0·708	0·730	0·748	0·765	0·778	0·791	0·803
0·4	V	2·427	2·699	2·952	3·196	3·425	3·646	3·940
	Q	1915·	2489·	3117·	3804·	4538·	5324·	6288·
	C	0·708	0·730	0·748	0·765	0·779	0·792	0·804
0·35	V	2·271	2·524	2·761	2·993	3·208	3·415	3·615
	Q	1792·	2328·	2916·	3562·	4251·	4987·	5770·
	C	0·708	0·730	0·748	0·766	0·780	0·793	0·805
0·3	V	2·099	2·337	2·559	2·775	2·974	3·165	3·351
	Q	1656·	2155·	2702·	3303·	3941·	4622·	5348·
	C	0·707	0·730	0·749	0·767	0·781	0·794	0·806
0·25	V	1·917	2·134	2·336	2·533	2·718	2·897	3·066
	Q	1513·	1968·	2467·	3015·	3601·	4230·	4893·
	C	0·707	0·730	0·749	0·767	0·782	0·796	0·808
0·2	V	1·714	1·966	2·192	2·269	2·437	2·601	2·753
	Q	1352·	1813·	2315·	2701·	3229·	3798·	4394·
	C	0·707	0·731	0·750	0·768	0·784	0·799	0·811
0·15	V	1·483	1·655	1·817	1·970	2·119	2·258	2·396
	Q	1170·	1526·	1919·	2345·	2808·	3297·	3824·
	C	0·706	0·731	0·752	0·770	0·787	0·801	0·815
0·10	V	1·208	1·352	1·488	1·617	1·742	1·862	1·978
	Q	953·1	1247·	1571·	1925·	2308·	2719·	3157·
	C	0·705	0·731	0·754	0·774	0·792	0·809	0·824
0·05	V	·8520	·9859	1·059	1·158	1·253	1·343	1·431
	Q	672·2	909·2	1118·	1378·	1660·	1961·	2284·
	C	0·703	0·733	0·759	0·784	0·806	0·825	0·843

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 260 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 6·5	7·	8.	9·	10·	12·	·14
0·5	V	4·535						
	Q	7856·						
	C	0·813						
0·45	V	4·308	4·507					
	Q	7463·	8424·					
	C	0·814	0·822					
0·4	V	4·066	4·254	4·621				
	Q	7043·	7951·	9907·				
	C	0·815	0·823	0·839				
0·35	V	3·808	3·984	4·334	4·658			
	Q	6596·	7446·	9292·	11277·			
	C	0·816	0·824	0·841	0·855			
0·3	V	3·530	3·702	4·022	4·328	4·617		
	Q	6115·	6919·	8623·	11686·	12466·		
	C	0·817	0·827	0·843	0·858	0·871		
0·25	V	3·229	3·388	3·684	3·969	4·234	4·731	
	Q	5593·	6332·	7899·	10716·	11432·	15442·	
	C	0·819	0·829	0·846	0·862	0·875	0·898	
0·2	V	2·903	3·041	3·311	3·570	3·813	4·255	4·665
	Q	5029·	5684·	7099·	9639·	10295·	13888·	17895·
	C	0·823	0·832	0·850	0·867	0·881	0·903	0·922
0·15	V	2·529	2·652	2·891	3·117	3·332	3·729	4·093
	Q	4381·	4957·	6198·	8416·	8996·	12172·	15701·
	C	0·828	0·838	0·857	0·874	0·889	0·914	0·934
0·10	V	2·088	2·195	2·396	2·589	2·772	3·109	3·420
	Q	3617·	4102·	5137·	6990·	7484·	10148·	13119·
	C	0·837	0·849	0·870	0·889	0·906	0·933	0·956
0·05	V	1·517	1·599	1·753	1·905	2·047	2·314	2·560
	Q	2628·	2989·	3758·	5144·	5527·	7553·	9820·
	C	0·860	0·875	0·900	0·925	0·946	0·982	1·012

and cubic feet per second.

TABLE X.

Mean Velocities of Discharge (V), Quantities dis-

For Canals in Earth, Class III., above the average, of

For a Bed-

N=0·0250.

S per thousand.		Depths of water in feet. 3·	3·5	4·	4·5	5·	5·5	6·
0·5	V	2·720	3·021	3·303	3·578	3·829	4·078	4·311
	Q	2309·	2998·	3752·	4581·	5456·	6404·	7398·
	C	0·709	0·730	0·748	0·765	0·778	0·791	0·802
0·45	V	2·576	2·865	3·133	3·393	3·632	3·868	4·094
	Q	2187·	2843·	3559·	4344·	5176·	6074·	7025·
	C	0·708	0·730	0·748	0·765	0·778	0·791	0·803
0·4	V	2·429	2·701	2·958	3·203	3·429	3·651	3·865
	Q	2062·	2680·	3360·	4101·	4886·	5733·	6632·
	C	0·708	0·730	0·749	0·766	0·779	0·792	0·804
0·35	V	2·272	2·526	2·767	2·997	3·208	3·419	3·620
	Q	1929·	2506·	3143·	3837·	4571·	5369·	6212·
	C	0·708	0·730	0·749	0·766	0·779	0·793	0·805
0·3	V	2·103	2·339	2·562	2·778	2·973	3·170	3·355
	Q	1785·	2321·	2910·	3557·	4237·	4978·	5757·
	C	0·708	0·730	0·749	0·767	0·780	0·794	0·806
0·25	V	1·918	2·136	2·341	2·536	2·722	2·902	3·071
	Q	1628·	2119·	2659·	3247·	3879·	4557·	5270·
	C	0·707	0·730	0·750	0·767	0·782	0·796	0·808
0·2	V	1·715	1·912	2·097	2·274	2·441	2·605	2·756
	Q	1456·	1897·	2382·	2911·	3478·	4091·	4729·
	C	0·707	0·731	0·751	0·768	0·784	0·799	0·811
0·15	V	1·483	1·656	1·819	1·972	2·122	2·264	2·399
	Q	1259·	1643·	2066·	2525·	3024·	3555·	4117·
	C	0·706	0·731	0·752	0·770	0·787	0·802	0·815
0·10	V	1·211	1·354	1·491	1·618	1·745	1·867	1·981
	Q	1028·	1344·	1694·	2071·	2487·	2932·	3399·
	C	0·706	0·732	0·755	0·774	0·793	0·810	0·824
0·05	V	·8539	·9588	1·062	1·159	1·256	1·346	1·435
	Q	725·0	951·4	1206·	1484·	1790·	2114·	2463·
	C	0·704	0·733	0·760	0·784	0·807	0·826	0·844

V and Q are always in feet

TABLE X.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 280 feet.

N=0·0250.

S per thousand.		Depths of water in feet. 6·5	7	8	9	10	12	14
0·5	V	4·541						
	Q	8457·						
	C	0·813						
0·45	V	4·313	4·514					
	Q	8032·	9069·					
	C	0·814	0·822					
0·4	V	4·072	4·261	4·635				
	Q	7583·	8560·	10679·				
	C	0·815	0·823	0·840				
0·35	V	3·814	3·991	4·346	4·673			
	Q	7103·	8018·	10013·	12154·			
	C	0·816	0·824	0·842	0·856			
0·3	V	3·535	3·707	4·033	4·341	4·632		
	Q	6583·	7447·	9292·	11291·	13433·		
	C	0·817	0·827	0·844	0·859	0·872		
0·25	V	3·235	3·393	3·695	3·982	4·249	4·749	
	Q	6024·	6817·	8513·	10357·	12322·	16640·	
	C	0·819	0·829	0·847	0·863	0·876	0·899	
0·2	V	2·908	3·050	3·321	3·582	3·825	4·270	4·684
	Q	5415·	6127·	7652·	9317·	11093·	14962·	19279·
	C	0·823	0·833	0·851	0·868	0·882	0·904	0·923
0·15	V	2·533	2·660	2·899	3·127	3·343	3·743	4·109
	Q	4717·	5344·	6679·	8133·	9695·	13116·	16913·
	C	0·828	0·839	0·858	0·875	0·890	0·915	0·935
0·1	V	2·093	2·198	2·404	2·597	2·782	3·120	3·435
	Q	3898·	4416·	5539·	6756·	8068·	10933·	14139·
	C	0·838	0·849	0·870	0·890	0·907	0·934	0·957
0·05	V	1·521	1·604	1·758	1·911	2·054	2·322	2·571
	Q	2833·	3222·	4050·	4971·	5957·	8136·	10582·
	C	0·861	0·876	0·901	0·926	0·947	0·983	1·013

and cubic feet per second.

TABLE X.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class III., in good average order, of

For a Bed-

N=0·0250.

S per thousand.		Depths of water in feet. 3·	3·5	4·	4·5	5·	5·5	6·
0·5	V	2·722	3·022	3·310	3·581	3·838	4·082	4·321
	Q	2474·	3210·	4025·	4907·	5853·	6859·	7933·
	C	0·709	0·730	0·749	0·765	0·779	0·791	0·803
0·45	V	2·582	2·867	3·141	3·397	3·641	3·872	4·104
	Q	2347·	3046·	3839·	4655·	5552·	6506·	7535·
	C	0·709	0·730	0·749	0·765	0·779	0·791	0·804
0·4	V	2·435	2·703	2·965	3·207	3·445	3·655	3·874
	Q	2213·	2871·	3605·	4394·	5253·	6141·	7113·
	C	0·709	0·730	0·750	0·766	0·780	0·792	0·805
0·35	V	2·277	2·529	2·773	3·000	3·219	3·423	3·629
	Q	2070·	2686·	3372·	4111·	4909·	5752·	6663·
	C	0·709	0·730	0·750	0·766	0·781	0·793	0·806
0·3	V	2·105	2·341	2·571	2·781	2·984	3·174	3·364
	Q	1913·	2486·	3126·	3811·	4551·	5333·	6176·
	C	0·708	0·730	0·751	0·767	0·782	0·794	0·807
0·25	V	1·922	2·140	2·348	2·543	2·728	2·905	3·078
	Q	1747·	2273·	2887·	3484·	4160·	4881·	5651·
	C	0·708	0·731	0·751	0·768	0·783	0·796	0·809
0·2	V	1·716	1·914	2·102	2·276	2·446	2·607	2·764
	Q	1560·	2033·	2556·	3119·	3730·	4380·	5075·
	C	0·707	0·731	0·752	0·769	0·785	0·799	0·812
0·15	V	1·491	1·657	1·823	1·977	2·127	2·266	2·408
	Q	1355·	1760·	2217·	2709·	3243·	3807·	4421·
	C	0·706	0·731	0·753	0·771	0·788	0·802	0·817
0·1	V	1·212	1·356	1·497	1·623	1·748	1·869	1·983
	Q	1102·	1440·	1820·	2224·	2666·	3140·	3641·
	C	0·706	0·732	0·757	0·775	0·793	0·810	0·824
0·05	V	·8547	·9608	1·064	1·162	1·257	1·348	1·436
	Q	776·9	1020·	1294·	1592·	1917·	2265·	2617·
	C	0·704	0·734	0·761	0·785	0·807	0·826	0·844

V and Q are always in feet

TABLE X

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One

width of 300 feet.

N= ·0250.

S per thousand.		Depths of water in feet. 7	8	9	10	12	14	16
0·5	V	4·765						
	Q	10240·						
	C	0·822						
0·45	V	4·526						
	Q	9726·						
	C	0·823						
0·4	V	4·272	4·648					
	Q	9181·	11453·					
	C	0·824	0·841					
0·35	V	4·001	4·358	4·692				
	Q	8598·	10738·	13050·				
	C	0·825	0·843	0·858				
0·3	V	3·713	4·044	4·354	4·642			
	Q	7979·	9964·	12108·	14390·			
	C	0·827	0·845	0·860	0·872			
0·25	V	3·398	3·709	3·989	4·256	4·759		
	Q	7302·	9139·	11093·	13194·	17818·		
	C	0·829	0·848	0·863	0·876	0·899		
0·2	V	3·054	3·330	3·588	3·833	4·285	4·700	5·081
	Q	6563·	8205·	9978·	11882·	16043·	20661·	25690·
	C	0·833	0·852	0·868	0·882	0·905	0·924	0·939
0·15	V	2·664	2·907	3·135	3·349	3·757	4·120	4·461
	Q	2725·	7163·	8721·	10382·	11055·	18112·	22555·
	C	0·839	0·859	0·876	0·890	0·916	0·935	0·952
0·10	V	2·204	2·407	2·604	2·787	3·130	3·446	3·734
	Q	4736·	5931·	7242·	8640·	11719·	15149·	18879·
	C	0·850	0·871	0·891	0·907	0·935	0·958	0·976
0·05	V	1·575	1·764	1·916	2·060	2·354	2·577	2·812
	Q	3385·	4346·	5328·	6386·	8813·	11328·	14217·
	C	0·859	0·903	0·927	0·948	0·984	1·013	1·039

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), IN FEET PER SECOND; QUANTITIES DISCHARGED (Q), IN CUBIC FEET PER SECOND; AND COEFFICIENTS (C) OF MEAN VELOCITY.

FOR CANALS OF TRAPEZOIDAL SECTION, WITH SIDE SLOPES OF ONE TO ONE, IN EARTH, IN CLASS IV., BELOW THE AVERAGE IN CONDITION AND REGIMEN; WHEN N, THE COEFFICIENT OF ROUGHNESS AND IRREGULARITY, $=0{\cdot}0275$.

GENERAL FORMULA, $Q = A.V = A.C.100\sqrt{RS}$.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-width of 2 feet.

N=0·0275.

S per thousand.		Depths of water in feet.						
		0·5	0·75	1·	1·25	1·5	1·75	2·
5·0	V	1·561	2·025	2·418	2·762	3·074	3·363	3·643
	Q	1·951	4·172	7·254	11·21	16·14	22·06	29·14
	C	0·365	0·405	0·434	0·456	0·474	0·490	0·504
3·0	V	1·210	1·569	1·873	2·140	2·381	2·605	2·822
	Q	1·512	3·232	5·619	8·688	12·50	17·09	22·58
	C	0·365	0·405	0·434	0·456	0·474	0·490	0·504
2·0	V	0·988	1·281	1·529	1·747	1·944	2·127	2·304
	Q	1·235	2·639	4·587	7·493	10·21	13·95	18·43
	C	0·365	0·405	0·434	0·456	0·474	0·490	0·504
1·0	V	0·698	1·129	1·082	1·236	1·375	1·504	1·629
	Q	0·872	2·325	3·246	5·018	7·219	9·866	13·03
	C	0·365	0·405	0·434	0·456	0·474	0·490	0·504
0·8	V	0·621	0·806	0·963	1·104	1·224	1·340	1·454
	Q	0·776	1·660	2·889	4·482	6·426	8·790	11·63
	C	0·363	0·403	0·432	0·454	0·472	0·488	0·503
0·6	V	0·534	0·693	0·828	0·992	1·056	1·155	1·255
	Q	0·668	1·428	2·484	4·028	5·544	7·577	10·04
	C	0·360	0·400	0·429	0·451	0·470	0·486	0·501
0·5	V	0·484	0·629	0·754	0·862	0·962	1·052	1·143
	Q	0·605	1·296	2·262	3·500	5·051	6·901	9·144
	C	0·358	0·398	0·428	0·450	0·469	0·485	0·500
0·4	V	0·431	0·560	0·671	0·767	0·857	0·936	1·016
	Q	0·539	1·154	2·013	3·114	4·499	6·140	8·128
	C	0·356	0·396	0·426	0·448	0·407	0·482	0·497
0·2	V	0·294	0·384	0·459	0·530	0·593	0·648	0·704
	Q	0·368	0·791	1·377	2·152	3·113	4·251	5·632
	C	0·344	0·384	0·412	0·437	0·457	0·472	0·487
0·1	V	0·196	0·258	0·312	0·361	0·404	0·443	0·483
	Q	0·245	0·531	0·936	1·466	2·121	2·906	3·864
	C	0·324	0·365	0·396	0·421	0·441	0·457	0·473

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

For a Bed-width of 3 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 0·5	0·75	1·	1·5	2·	2·5	3·
5·0	V	1·669	2·194	2·612	3·331	3·936	4·469	4·948
	Q	2·921	6·165	10·45	22·48	39·36	61·45	93·06
	C	0·375	0·418	0·446	0·488	0·518	0·541	0·559
3·0	V	1·293	1·696	2·024	2·581	3·049	3·462	3·833
	Q	2·262	4·766	8·096	17·42	30·49	47·60	68·99
	C	0·375	0·418	0·446	0·488	0·518	0·541	0·559
2·0	V	1·055	1·385	1·652	2·107	2·490	2·827	3·129
	Q	1·846	3·892	6·608	14·22	24·90	38·87	56·32
	C	0·375	0·418	0·446	0·488	0·518	0·541	0·559
1·0	V	0·746	0·979	1·168	1·490	1·761	1·999	2·213
	Q	1·306	2·751	4·672	10·06	17·61	27·50	39·83
	C	0·375	0·418	0·446	0·488	0·518	0·541	0·559
0·8	V	0·664	0·872	1·040	1·327	1·572	1·785	1·976
	Q	1·162	2·450	4·160	8·957	15·72	24·54	35·57
	C	0·373	0·416	0·444	0·486	0·517	0·540	0·558
0·6	V	0·573	0·751	0·895	1·145	1·356	1·540	1·705
	Q	1·004	2·110	3·580	7·729	13·56	21·18	30·69
	C	0·372	0·414	0·441	0·484	0·515	0·538	0·556
0·5	V	0·521	0·683	0·817	1·043	1·233	1·403	1·553
	Q	0·912	0·918	3·268	7·040	12·33	19·29	27·95
	C	0·370	0·412	0·441	0·483	0·513	0·537	0·555
0·4	V	0·461	0·606	0·726	0·927	1·098	1·253	1·387
	Q	0·807	1·703	2·904	6·257	10·98	17·23	24·97
	C	0·366	0·409	0·438	0·480	0·511	0·536	0·554
0·2	V	0·315	0·416	0·499	0·642	0·775	0·871	0·967
	Q	0·551	1·169	1·996	4·333	7·750	11·98	17·41
	C	0·354	0·397	0·426	0·470	0·501	0·527	0·546
0·1	V	0·211	0·281	0·339	0·440	0·524	0·600	0·672
	Q	0·369	0·790	1·356	2·970	5·240	8·250	12·10
	C	0·336	0·379	0·409	0·455	0·487	0·514	0·537

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-width of 4 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 1·	1·5	2·	2·5	3·	3·5	4·
5·0	V	2·753	3·507	4·155	4·711	5·209	5·676	6·125
	Q	13·77	28·93	49·86	76·55	109·4	149·0	196·0
	C	0·455	0·496	0·527	0·550	0·568	0·584	0·599
3·0	V	2·132	2·716	3·229	3·650	4·035	4·396	4·743
	Q	10·66	22·41	38·75	59·31	84·74	115·4	151·8
	C	0·455	0·496	0·527	0·550	0·568	0·584	0·599
2·0	V	1·741	2·218	2·628	2·980	3·294	3·590	3·873
	Q	8·705	18·30	31·54	48·43	69·17	94·24	123·9
	C	0·455	0·496	0·527	0·550	0·568	0·584	0·599
1·0	V	1·231	1·568	1·858	2·107	2·329	2·538	2·739
	Q	6·155	12·94	22·30	34·24	48·91	66·62	87·65
	C	0·455	0·496	0·527	0·550	0·568	0·584	0·599
0·8	V	1·096	1·400	1·658	1·881	2·080	2·266	2·445
	Q	5·480	11·55	19·90	30·57	43·68	59·48	78·24
	C	0·453	0·495	0·526	0·549	0·567	0·583	0·598
0·6	V	0·943	1·207	1·431	1·623	1·798	1·960	2·114
	Q	4·715	9·958	17·17	26·37	37·76	51·45	67·65
	C	0·450	0·493	0·524	0·547	0·566	0·582	0·597
0·5	V	0·861	1·100	1·304	1·479	1·639	1·785	1·927
	Q	4·305	9·075	15·65	24·03	34·42	46·86	61·66
	C	0·450	0·492	0·523	0·546	0·565	0·581	0·596
0·4	V	0·765	0·980	1·162	1·321	1·460	1·594	1·720
	Q	3·825	8·085	13·94	21·47	30·66	41·84	55·04
	C	0·447	0·490	0·521	0·545	0·563	0·580	0·595
0·2	V	0·528	0·679	0·809	0·920	1·023	1·118	1·210
	Q	2·640	5·602	9·708	14·95	21·48	28·25	38·72
	C	0·436	0·480	0·513	0·537	0·558	0·575	0·592
0·1	V	0·360	0·465	0·556	0·639	0·711	0·778	0·846
	Q	1·800	3·836	6·672	10·38	14·93	20·42	27·07
	C	0·420	0·465	0·499	0·527	0·548	0·566	0·585

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

For a Bed-width of 5 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 1·	2·	2·5	3·	3·5	4·	5·
5·0	V	2·853	4·329	4·908	5·424	5·915	6·363	7·178
	Q	17·12	60·61	92·03	130·2	176·0	229·1	356·9
	C	0·461	0·534	0·557	0·575	0·592	0·606	0·628
3·0	V	2·210	3·353	3·802	4·202	4·583	4·931	5·559
	Q	13·26	46·96	71·29	100·8	136·4	177·5	277·9
	C	0·461	0·534	0·557	0·575	0·592	0·606	0·628
2·0	V	1·804	2·737	3·104	3·431	3·741	4·026	4·539
	Q	108·2	38·32	58·20	82·34	111·3	144·9	226·9
	C	0·461	0·534	0·557	0·575	0·592	0·606	0·628
1·0	V	1·276	1·936	2·195	2·426	2·646	2·847	3·210
	Q	7·656	27·10	41·16	58·22	78·72	102·5	160·5
	C	0·461	0·534	0·557	0·575	0·592	0·606	0·628
0·8	V	1·136	1·728	1·959	2·166	2·361	2·546	2·871
	Q	6·816	24·19	36·73	51·98	70·24	91·66	143·6
	C	0·459	0·533	0·556	0·574	0·591	0·606	0·628
0·6	V	0·978	1·494	1·694	1·873	2·042	2·202	2·486
	Q	5·868	22·92	31·76	44·95	60·75	79·27	124·3
	C	0·456	0·532	0·555	0·573	0·590	0·605	0·628
0·5	V	0·888	1·361	1·544	1·706	1·862	2·006	2·270
	Q	5·328	19·05	28·95	40·94	55·40	72·22	113·5
	C	0·454	0·531	0·554	0·572	0·589	0·604	0·628
0·4	V	0·791	1·215	1·371	1·523	1·662	1·792	2·026
	Q	4·746	17·01	25·71	36·55	49·45	64·51	101·3
	C	0·452	0·530	0·550	0·571	0·588	0·603	0·627
0·2	V	0·547	0·887	0·961	1·068	1·168	1·261	1·429
	Q	3·282	12·42	18·02	25·63	34·75	45·40	71·45
	C	0·442	0·521	0·545	0·566	0·584	0·600	0·625
0·1	V	0·373	0·581	0·667	0·743	0·814	0·902	1·004
	Q	2·238	8·134	12·51	17·83	24·22	32·47	50·20
	C	0·426	0·507	0·535	0·557	0·576	0·593	0·621

and cubic feet per second.

TABLE XI.

Mean Velocities of Discharge (V), Quantities dis-

For Canals in Earth, Class IV., below the average, of

For a Bed-width of 6 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 1·	2·	2·5	3·	3·5	4·	5·
5·0	V	2·941	4·483	5·095	5·628	6·124	6·577	7·398
	Q	20·59	71·73	108·3	152·0	203·6	263·1	406·9
	C	0·467	0·541	0·565	0·583	0·599	0·612	0·634
3·0	V	2·278	3·496	3·946	4·360	4·743	5·096	5·739
	Q	15·95	55·94	83·85	117·7	157·7	203·8	315·6
	C	0·467	0·541	0·565	0·583	0·599	0·612	0·634
2·0	V	1·860	2·835	3·222	3·566	3·873	4·161	4·686
	Q	11·02	45·36	68·47	96·29	128·8	166·4	257·7
	C	0·467	0·541	0·565	0·583	0·599	0·612	0·634
1·0	V	1·315	2·004	2·278	2·517	2·739	2·942	3·313
	Q	9·205	32·06	48·41	67·96	91·07	117·7	182·2
	C	0·467	0·541	0·565	0·583	0·599	0·612	0·634
0·8	V	1·171	1·880	2·034	2·247	2·445	2·632	2·963
	Q	8·197	30·08	43·22	60·67	81·30	105·3	163·0
	C	0·465	0·540	0·564	0·582	0·598	0·612	0·634
0·6	V	1·008	1·547	1·755	1·943	2·114	2·275	2·566
	Q	7·056	24·75	37·29	52·46	70·29	91·00	141·1
	C	0·462	0·539	0·562	0·581	0·597	0·611	0·634
0·5	V	0·916	1·410	1·599	1·771	1·927	2·077	2·339
	Q	6·412	22·56	33·98	47·82	64·07	83·08	128·6
	C	0·460	0·538	0·561	0·580	0·596	0·610	0·633
0·4	V	0·816	1·259	1·431	1·581	1·720	1·851	2·092
	Q	5·742	20·14	30·41	42·69	57·19	74·04	115·1
	C	0·458	0·537	0·561	0·579	0·595	0·609	0·633
0·2	V	0·564	0·878	0·997	1·101	1·211	1·305	1·475
	Q	3·948	14·05	21·19	29·73	40·27	52·20	81·13
	C	0·448	0·530	0·553	0·570	0·592	0·607	0·631
0·1	V	0·384	0·606	0·694	0·773	0·846	0·912	1·037
	Q	2·688	9·696	14·75	20·87	28·13	36·48	57·04
	C	0·431	0·517	0·544	0·566	0·585	0·600	0·628

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

For a Bed-width of 8 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 1·	2·	2·5	3·	3·5	4·	5·
5·0	V	3·049	4·706	5·339	5·926	6·434	6·924	7·805
	Q	27·44	94·12	140·1	195·6	259·0	332·4	507·3
	C	0·473	0·550	0·572	0·592	0·607	0·621	0·644
3·0	V	2·362	3·644	4·135	4·589	4·986	5·363	6·044
	Q	21·26	72·88	108·5	151·4	200·7	257·4	392·9
	C	0·473	0·550	0·572	0·592	0·607	0·621	0·644
2·0	V	1·928	2·976	3·377	3·746	4·071	4·379	4·935
	Q	17·35	59·52	88·65	123·6	163·9	210·2	320·8
	C	0·473	0·550	0·572	0·592	0·607	0·621	0·644
1·0	V	1·364	2·104	2·388	2·649	2·878	3·096	3·489
	Q	12·28	42·08	62·69	87·42	115·8	148·6	226·8
	C	0·473	0·550	0·572	0·592	0·607	0·621	0·644
0·8	V	1·214	1·879	2·132	2·365	2·575	2·770	3·121
	Q	10·93	37·58	55·97	78·04	103·6	133·0	202·9
	C	0·471	0·549	0·571	0·591	0·607	0·621	0·644
0·6	V	1·047	1·621	1·843	2·045	2·226	2·394	2·703
	Q	9·423	32·42	48·38	67·49	89·59	114·9	175·7
	C	0·469	0·547	0·570	0·590	0·606	0·620	0·644
0·5	V	0·952	1·477	1·679	1·864	2·032	2·186	2·467
	Q	8·518	29·54	44·07	61·51	81·79	104·9	160·4
	C	0·467	0·546	0·569	0·589	0·606	0·620	0·644
0·4	V	0·848	1·321	1·500	1·664	1·815	1·952	2·204
	Q	7·584	26·42	39·38	54·91	73·05	93·70	143·3
	C	0·465	0·546	0·568	0·588	0·605	0·619	0·643
0·2	V	0·586	0·919	1·052	1·174	1·277	1·376	1·556
	Q	5·274	18·38	27·62	38·74	51·39	66·05	101·1
	C	0·455	0·537	0·563	0·584	0·602	0·617	0·642
0·1	V	0·400	0·636	0·732	0·815	0·891	0·965	1·098
	Q	3·600	12·72	19·22	26·90	35·86	46·32	71·37
	C	0·438	0·526	0·555	0·576	0·594	0·612	0·641

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-width of 10 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 1·	2·	3·	3·5	4·	4·5	·5
2·0	V	1·967	3·073	3·898	4·245	4·560	4·865	5·140
	Q	21·64	73·75	152·0	200·6	255·4	317·4	385·5
	C	0·475	0·555	0·600	0·616	0·629	0·642	0·652
1·5	V	1·804	2·661	3·376	3·676	3·961	4·213	4·451
	Q	19·84	63·86	131·7	173·7	221·8	274·9	333·8
	C	0·475	0·555	0·600	0·616	0·629	0·642	0·652
1·0	V	1·391	2·173	2·756	3·002	3·224	3·440	3·634
	Q	15·30	52·15	107·5	141·8	180·5	224·5	272·5
	C	0·475	0·555	0·600	0·616	0·629	0·642	0·652
0·8	V	1·242	1·940	2·465	2·685	2·884	3·077	3·250
	Q	13·66	46·56	96·14	126·9	161·5	200·8	243·7
	C	0·474	0·554	0·600	0·616	0·629	0·642	0·652
0·6	V	1·070	1·677	2·131	2·322	2·498	2·664	2·815
	Q	11·77	40·25	83·11	109·7	139·9	173·8	211·0
	C	0·472	0·553	0·599	0·615	0·629	0·642	0·652
0·4	V	0·865	1·367	1·734	1·892	2·039	2·172	2·295
	Q	9·515	32·81	67·63	89·40	114·2	141·7	172·0
	C	0·467	0·552	0·597	0·614	0·629	0·641	0·651
0·3	V	0·743	1·178	1·497	1·636	1·763	1·881	1·988
	Q	8·173	28·27	58·38	77·30	98·73	122·7	149·1
	C	0·463	0·549	0·595	0·613	0·628	0·641	0·651
0·2	V	0·599	0·953	1·218	1·331	1·437	1·533	1·622
	Q	6·589	22·87	47·50	62·89	80·47	100·0	121·6
	C	0·457	0·544	0·593	0·611	0·627	0·640	0·651
0·1	V	0·408	0·660	0·852	0·934	1·010	1·079	1·147
	Q	4·488	15·84	33·23	44·13	56·56	70·40	86·02
	C	0·441	0·533	0·587	0·606	0·623	0·637	0·651
0·05	V	0·275	0·452	0·591	0·651	0·707	0·758	0·809
	Q	3·025	10·85	23·05	30·76	39·59	49·46	60·67
	C	0·420	0·517	0·575	0·598	0·617	0·633	0·649

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

For a Bed-width of 12 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 1·	2·	3·	3·5	4·	4·5	5·
2·0	V	2·006	3·160	4·017	4·371	4·705	5·014	5·299
	Q	26·08	88·48	180·8	237·1	301·1	372·3	450·4
	C	0·479	0·561	0·606	0·621	0·635	0·647	0·657
1·5	V	1·737	2·736	3·478	3·785	4·074	4·344	4·588
	Q	22·58	76·61	156·5	205·3	260·7	322·5	390·0
	C	0·479	0·561	0·606	0·621	0·635	0·647	0·657
1·0	V	1·418	2·234	2·840	3·091	3·327	3·546	3·747
	Q	18·43	62·55	127·8	167·7	212·9	263·3	318·5
	C	0·479	0·561	0·606	0·621	0·635	0·647	0·657
0·8	V	1·266	1·995	2·540	2·764	2·976	3·172	3·351
	Q	16·46	55·86	114·3	150·0	190·5	235·5	284·8
	C	0·478	0·560	0·606	0·621	0·635	0·647	0·657
0·6	V	1·092	1·709	2·197	2·394	2·573	2·742	2·902
	Q	14·19	47·85	98·87	129·9	164·7	203·6	246·7
	C	0·476	0·559	0·605	0·621	0·634	0·646	0·657
0·4	V	0·882	1·406	1·787	1·952	2·101	2·239	2·370
	Q	11·46	39·37	80·42	105·9	134·5	166·2	201·5
	C	0·471	0·558	0·603	0·620	0·634	0·646	0·657
0·3	V	0·759	1·210	1·545	1·687	1·817	1·939	2·052
	Q	9·867	33·88	69·53	91·52	116·3	144·0	174·4
	C	0·468	0·555	0·602	0·619	0·633	0·646	0·657
0·2	V	0·612	0·978	1·258	1·393	1·478	1·581	1·675
	Q	7·956	27·38	56·61	75·57	94·59	117·4	142·4
	C	0·462	0·549	0·600	0·617	0·631	0·645	0·657
0·1	V	0·417	0·679	0·879	0·933	1·042	1·118	1·185
	Q	5·421	19·01	39·56	50·62	66·69	83·01	100·7
	C	0·445	0·539	0·593	0·612	0·629	0·645	0·657
0·05	V	0·280	0·466	0·611	0·673	0·732	0·788	0·838
	Q	3·640	13·05	27·50	36·51	46·85	58·51	71·23
	C	0·423	0·524	0·583	0·605	0·625	0·643	0·657

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-width of 14 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 1	2	3	4	5	6	7
2·0	V	2·035	3·212	4·102	4·828	5·440	5·977	6·482
	Q	30·53	102·8	209·2	347·6	516·8	717·2	952·9
	C	0·482	0·563	0·609	0·640	0·662	0·679	0·695
1·5	V	1·762	2·782	3·552	4·174	4·711	5·177	5·614
	Q	26·43	89·02	181·2	300·5	447·5	621·2	825·3
	C	0·482	0·563	0·609	0·640	0·662	0·679	0·695
1·0	V	1·439	2·272	2·900	3·414	3·846	4·227	4·584
	Q	21·58	72·70	147·9	245·8	365·4	507·2	673·8
	C	0·482	0·563	0·609	0·640	0·662	0·679	0·695
0·8	V	1·282	2·028	2·594	3·053	3·440	3·781	4·216
	Q	19·23	64·90	132·3	219·8	326·8	453·7	619·8
	C	0·480	0·562	0·609	0·640	0·662	0·679	0·695
0·6	V	1·107	1·750	2·243	2·640	2·980	3·279	3·556
	Q	16·61	56·00	114·4	190·1	283·1	393·5	522·7
	C	0·479	0·560	0·608	0·639	0·662	0·680	0·696
0·4	V	0·895	1·427	1·809	2·152	2·433	2·681	2·990
	Q	13·43	45·66	92·26	154·9	231·1	321·7	439·5
	C	0·474	0·559	0·606	0·638	0·662	0·681	0·697
0·3	V	0·770	1·229	1·581	1·864	2·106	2·326	2·521
	Q	11·55	39·33	80·63	134·2	200·1	279·1	370·6
	C	0·471	0·556	0·606	0·638	0·662	0·682	0·698
0·2	V	0·619	0·996	1·286	1·519	1·720	1·901	2·126
	Q	9·285	31·87	65·59	109·4	163·4	228·1	312·5
	C	0·464	0·552	0·604	0·637	0·662	0·683	0·701
0·1	V	0·423	0·693	0·899	1·072	1·219	1·350	1·514
	Q	6·345	22·18	45·85	77·18	115·8	162·0	222·6
	C	0·448	0·543	0·597	0·636	0·663	0·686	0·706
0·05	V	0·284	0·475	0·638	0·755	0·863	0·960	1·085
	Q	4·260	15·20	32·54	54·36	81·99	115·2	159·5
	C	0·425	0·527	0·588	0·633	0·664	0·690	0·715

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

For a Bed-width of 16 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 1	2	3	4	5	6	7
2·0	V	2·053	3·257	4·182	4·929	5·567	6·130	6·639
	Q	34·90	117·3	238·4	394·3	584·5	809·2	1069·
	C	0·483	0·565	0·613	0·644	0·667	0·685	0·700
1·5	V	1·777	2·821	3·622	4·268	4·822	5·309	5·749
	Q	30·21	101·6	206·5	341·4	506·3	700·8	927·2
	C	0·483	0·565	0·613	0·644	0·667	0·685	0·700
1·0	V	1·451	2·360	2·958	3·485	3·937	4·335	4·694
	Q	24·67	84·96	168·6	278·8	413·4	572·2	755·7
	C	0·483	0·565	0·613	0·644	0·667	0·685	0·700
0·8	V	1·293	2·060	2·646	3·118	3·521	3·877	4·199
	Q	21·98	74·16	150·8	249·4	369·7	511·8	676·0
	C	0·481	0·565	0·613	0·644	0·667	0·685	0·700
0·6	V	1·117	1·778	2·287	2·695	3·050	3·357	3·641
	Q	19·99	64·01	130·4	215·6	320·3	443·1	586·2
	C	0·480	0·563	0·612	0·643	0·667	0·685	0·701
0·4	V	0·903	1·446	1·862	2·262	2·490	2·745	2·977
	Q	15·35	53·06	106·1	181·0	261·5	362·3	479·3
	C	0·475	0·561	0·610	0·642	0·667	0·686	0·702
0·3	V	0·777	1·248	1·612	1·903	2·160	2·381	2·582
	Q	13·21	44·93	91·89	152·2	226·8	314·3	415·7
	C	0·472	0·559	0·610	0·642	0·668	0·687	0·703
0·2	V	0·625	1·012	1·312	1·551	1·764	1·947	2·117
	Q	10·63	36·43	74·80	124·1	185·2	257·0	340·8
	C	0·465	0·555	0·608	0·641	0·668	0·688	0·706
0·1	V	0·428	0·691	0·917	1·096	1·248	1·385	1·509
	Q	7·276	24·88	52·27	87·68	131·0	182·8	242·9
	C	0·450	0·536	0·601	0·640	0·669	0·692	0·712
0·05	V	0·288	0·483	0·610	0·772	0·884	0·988	1·083
	Q	4·896	17·39	34·77	61·76	92·82	130·4	174·4
	C	0·428	0·530	0·593	0·638	0·670	0·698	0·722

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-width of 18 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 1	2	3	4	5	6	7
2·0	V	2·067	3·297	4·218	5·014	5·668	6·243	6·775
	Q	39·27	131·9	265·7	441·2	651·8	899·0	1186·
	C	0·484	0·567	0·616	0·647	0·670	0·688	0·704
1·5	V	1·790	2·855	3·679	4·341	4·908	5·406	5·867
	Q	34·01	114·2	231·8	382·0	564·4	778·5	1027·
	C	0·484	0·567	0·616	0·647	0·670	0·688	0·704
1·0	V	1·462	2·332	3·004	3·545	4·008	4·414	4·790
	Q	27·78	93·28	189·3	312·0	460·9	635·6	838·2
	C	0·484	0·567	0·616	0·647	0·670	0·688	0·704
0·8	V	1·305	2·085	2·687	3·171	3·585	3·948	4·285
	Q	24·79	83·40	169·3	279·1	412·3	568·5	749·9
	C	0·483	0·567	0·616	0·647	0·670	0·688	0·704
0·6	V	1·125	1·800	2·323	2·742	3·104	3·424	3·716
	Q	21·38	72·00	146·3	241·3	357·0	493·1	650·3
	C	0·481	0·565	0·615	0·646	0·670	0·689	0·705
0·4	V	0·911	1·462	1·888	2·239	2·538	2·804	3·038
	Q	17·31	58·48	118·9	197·0	291·9	403·8	531·6
	C	0·477	0·562	0·612	0·646	0·671	0·691	0·706
0·3	V	0·784	1·261	1·633	1·939	2·198	2·432	2·631
	Q	14·90	50·44	102·9	170·6	252·8	350·2	460·3
	C	0·474	0·560	0·611	0·646	0·671	0·692	0·706
0·2	V	0·632	1·024	1·328	1·580	1·798	1·989	2·157
	Q	12·01	40·96	83·66	139·0	206·8	286·4	377·4
	C	0·468	0·557	0·609	0·645	0·672	0·693	0·709
0·1	V	0·421	0·714	0·932	1·114	1·275	1·414	1·541
	Q	7·999	28·56	58·72	98·03	146·6	203·6	269·6
	C	0·441	0·548	0·604	0·643	0·674	0·697	0·716
0·05	V	0·284	0·491	0·649	0·785	0·904	1·010	1·108
	Q	5·396	19·64	40·89	68·86	104·0	145·4	193·9
	C	0·420	0·533	0·595	0·641	0·676	0·704	0·728

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

For a Bed-width of 20 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 1	2	3	4	5	6	7
2·0	V	2·085	3·333	4·308	5·090	5·776	6·348	6·890
	Q	43·79	146·7	297·3	488·6	722·0	990·3	1302·
	C	0·486	0·569	0·619	0·650	0·675	0·691	0·707
1·5	V	1·805	2·885	3·731	4·408	5·002	5·498	5·966
	Q	37·91	126·9	257·4	423·2	625·2	857·7	1128·
	C	0·486	0·569	0·619	0·650	0·675	0·691	0·707
1·0	V	1·474	2·356	3·047	3·599	4·084	4·489	4·872
	Q	30·95	103·7	210·2	345·5	510·5	700·3	938·7
	C	0·486	0·569	0·619	0·650	0·675	0·691	0·707
0·8	V	1·316	2·108	2·720	3·219	3·653	4·015	4·357
	Q	27·64	92·75	187·7	309·0	456·6	626·3	823·5
	C	0·485	0·569	0·618	0·650	0·675	0·691	0·707
0·6	V	1·135	1·819	2·352	2·788	3·168	3·482	3·773
	Q	23·84	80·04	162·3	267·6	386·0	543·2	713·1
	C	0·483	0·567	0·617	0·650	0·676	0·692	0·707
0·4	V	0·919	1·477	1·914	2·273	2·591	2·852	3·085
	Q	19·30	65·00	132·1	218·2	323·9	444·9	583·1
	C	0·479	0·564	0·615	0·649	0·677	0·694	0·708
0·3	V	0·791	1·275	1·655	2·144	2·247	2·473	2·676
	Q	16·61	56·10	114·2	205·8	280·9	385·8	505·8
	C	0·476	0·562	0·614	0·649	0·678	0·695	0·709
0·2	V	0·638	1·035	1·347	1·611	1·837	2·022	2·194
	Q	13·40	45·54	92·94	154·7	229·6	315·4	414·7
	C	0·470	0·559	0·612	0·649	0·679	0·696	0·712
0·1	V	0·434	0·721	0·944	1·136	1·303	1·439	1·639
	Q	9·114	31·72	65·14	109·1	162·9	224·5	309·8
	C	0·453	0·550	0·607	0·649	0·681	0·700	0·719
0·05	V	0·293	0·495	0·659	0·802	0·925	1·029	1·131
	Q	6·153	21·78	45·47	76·99	115·6	160·5	213·8
	C	0·432	0·535	0·599	0·648	0·684	0·709	0·734

and cubic feet per second.

TABLE XI.

Mean Velocities of Discharge (V), Quantities dis-

For Canals in Earth, Class IV., below the average, of

For a Bed-width of 35 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 2	3	4	5	6	7	8
1·0	V	2·470	3·221	3·842	4·377	4·864	5·296	5·678
	Q	182·8	367·2	599·4	875·4	1197·	1557·	1953·
	C	0·579	0·629	0·662	0·686	0·707	0·723	0·735
0·8	V	2·209	2·881	3·436	3·914	4·350	4·736	5·086
	Q	163·5	328·4	536·0	782·8	1070·	1393·	1750·
	C	0·579	0·629	0·662	0·686	0·707	0·723	0·736
0·6	V	1·910	2·491	2·976	3·395	3·773	4·108	4·416
	Q	141·3	284·0	464·3	679·0	928·2	1208·	1519·
	C	0·578	0·628	0·662	0·687	0·708	0·724	0·738
0·5	V	1·741	2·274	2·717	3·104	3·449	3·755	4·032
	Q	128·8	259·2	423·9	620·8	848·5	1104·	1387·
	C	0·577	0·628	0·662	0·688	0·709	0·725	0·738
0·4	V	1·551	2·034	2·439	2·780	3·085	3·363	3·616
	Q	114·8	241·9	380·5	556·0	758·9	988·7	1244·
	C	0·575	0·628	0·662	0·689	0·709	0·726	0·740
0·3	V	1·342	1·759	2·104	2·411	2·675	2·921	3·140
	Q	99·31	200·5	329·2	482·2	658·1	858·8	1080·
	C	0·574	0·627	0·662	0·690	0·710	0·728	0·742
0·2	V	1·088	1·431	1·719	1·971	2·191	2·398	2·581
	Q	80·51	163·1	268·2	394·2	528·0	703·0	887·9
	C	0·570	0·625	0·662	0·691	0·712	0·732	0·747
0·15	V	0·936	1·235	1·488	1·710	1·908	2·085	2·250
	Q	69·26	140·8	225·9	342·0	469·4	613·0	774·0
	C	0·566	0·623	0·662	0·692	0·716	0·735	0·752
0·10	V	0·758	1·006	1·217	1·403	1·569	1·716	1·854
	Q	56·09	114·7	189·9	280·6	388·4	504·6	637·8
	C	0·562	0·621	0·663	0·695	0·721	0·741	0·759
0·05	V	0·522	0·705	0·862	1·002	1·128	1·242	1·348
	Q	38·63	80·37	134·5	200·4	277·5	365·2	463·7
	C	0·547	0·616	0·664	0·702	0·733	0·758	0·780

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

For a Bed-width of 40 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 2	3	4	5	6	7	8
1·0	V	2·488	3·260	3·830	4·441	4·928	5·377	5·787
	Q	209·0	420·5	674·1	999·2	1360·	1769·	2222·
	C	0·580	0·632	0·654	0·689	0·708	0·725	0·739
0·8	V	2·225	2·916	3·426	3·972	4·407	4·816	5·183
	Q	186·9	396·2	603·0	893·7	1216·	1584·	1990·
	C	0·580	0·632	0·654	0·689	0·708	0·726	0·740
0·6	V	1·924	2·521	2·968	3·445	3·822	4·177	4·500
	Q	161·6	325·2	522·4	775·1	1055·	1374·	1728·
	C	0·579	0·631	0·654	0·690	0·709	0·727	0·742
0·5	V	1·753	2·301	2·710	3·150	3·494	3·818	4·108
	Q	147·3	296·8	470·0	708·7	964·4	1256·	1577·
	C	0·578	0·631	0·654	0·691	0·710	0·728	0·742
0·4	V	1·563	2·058	2·422	2·821	3·130	3·420	3·685
	Q	131·3	265·5	426·3	634·7	863·9	1125·	1415·
	C	0·576	0·631	0·654	0·692	0·711	0·729	0·744
0·3	V	1·351	1·780	2·098	2·447	2·714	2·969	3·195
	Q	113·5	229·6	369·3	550·6	749·1	976·8	1227·
	C	0·575	0·630	0·654	0·693	0·712	0·731	0·745
0·2	V	1·098	1·449	1·716	2·001	2·229	2·438	2·630
	Q	92·23	186·9	302·0	450·2	615·2	882·6	1010·
	C	0·572	0·628	0·655	0·694	0·716	0·735	0·751
0·15	V	0·944	1·251	1·486	1·738	1·936	2·122	2·293
	Q	78·30	161·4	261·5	391·0	534·3	698·1	880·5
	C	0·568	0·626	0·655	0·696	0·718	0·739	0·756
0·10	V	0·765	1·018	1·215	1·423	1·594	1·750	1·892
	Q	64·26	131·3	213·8	320·2	440·0	575·8	726·5
	C	0·564	0·624	0·656	0·698	0·724	0·746	0·764
0·05	V	0·527	0·714	0·861	1·018	1·144	1·264	1·376
	Q	44·27	91·11	151·5	229·0	315·8	415·9	528·4
	C	0·549	0·619	0·657	0·706	0·735	0·762	0·786

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-

N=0·0275.

S per thousand.		Depths of water in feet. 2·	2·5	3·	3·5	4·	4·5	5·
0·8	V	2·253	2·621	2·952	3·267	3·546	3·809	4·064
	Q	234·3	344·0	469·4	611·7	765·9	934·2	1118·
	C	0·583	0·611	0·633	0·652	0·668	0·681	0·694
0·6	V	1·949	2·266	2·557	2·824	3·071	3·304	3·524
	Q	202·7	297·4	406·6	528·8	663·3	810·3	969·1
	C	0·582	0·610	0·633	0·652	0·668	0·682	0·695
0·5	V	1·776	2·065	2·330	2·577	2·808	3·016	3·218
	Q	184·7	271·0	370·5	482·5	606·5	739·7	884·9
	C	0·581	0·609	0·632	0·652	0·669	0·682	0·695
0·4	V	1·582	1·844	2·084	2·302	2·511	2·701	2·878
	Q	164·5	242·0	331·4	431·1	542·4	662·4	771·4
	C	0·579	0·608	0·632	0·651	0·669	0·683	0·695
0·3	V	1·368	1·597	1·802	1·993	2·178	2·343	2·496
	Q	142·2	209·6	286·5	373·2	470·4	574·6	686·4
	C	0·578	0·608	0·631	0·651	0·670	0·684	0·696
0·25	V	1·247	1·456	1·642	1·820	1·989	2·138	2·282
	Q	129·7	191·1	261·1	340·8	429·6	524·4	627·5
	C	0·577	0·607	0·630	0·651	0·670	0·684	0·697
0·2	V	1·111	1·300	1·467	1·627	1·778	1·916	2·044
	Q	115·5	170·6	233·3	304·7	384·0	469·9	562·3
	C	0·575	0·606	0·629	0·651	0·670	0·685	0·698
0·15	V	0·956	1·120	1·274	1·408	1·543	1·661	1·773
	Q	99·42	147·0	202·6	263·6	332·5	407·4	487·5
	C	0·571	0·603	0·628	0·650	0·671	0·686	0·699
0·10	V	0·774	0·909	1·032	1·149	1·259	1·363	1·452
	Q	80·49	119·3	164·1	215·2	271·9	334·3	399·3
	C	0·566	0·599	0·626	0·650	0·671	0·689	0·703
0·05	V	0·534	0·635	0·725	0·813	0·892	0·971	1·041
	Q	55·53	83·34	115·3	152·2	192·7	238·1	286·2
	C	0·552	0·592	0·622	0·650	0·672	0·694	0·711

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 50 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 5·5	6·	6·5	7·	7·5	8·	9·
0·8	V	4·303						
	Q	1313·						
	C	0·705						
0·6	V	3·731	3·917	4·110				
	Q	1139·	1316·	1509·				
	C	0·706	0·714	0·724				
0·5	V	3·411	3·581	3·758	3·919	4·072		
	Q	1041·	1203·	1380·	1564·	1756·		
	C	0·707	0·715	0·725	0·733	0·740		
0·4	V	3·051	3·208	3·365	3·515	3·651	3·781	4·038
	Q	931·3	1078·	1236·	1403·	1575·	1754·	2144·
	C	0·707	0·716	0·726	0·735	0·742	0·748	0·761
0·3	V	2·647	2·785	2·922	3·048	3·167	3·288	3·515
	Q	808·0	935·8	1073·	1216·	1366·	1526·	1866·
	C	0·708	0·718	0·728	0·736	0·743	0·751	0·765
0·25	V	2·419	2·547	2·672	2·786	2·899	3·010	3·218
	Q	738·4	855·8	981·3	1112·	1250·	1397·	1709·
	C	0·709	0·719	0·729	0·737	0·745	0·753	0·767
0·2	V	2·167	2·287	2·399	2·502	2·607	2·706	2·889
	Q	661·5	768·4	881·0	997·3	1124·	1255·	1534·
	C	0·710	0·722	0·732	0·740	0·749	0·757	0·770
0·15	V	1·884	1·986	2·087	2·181	2·273	2·353	2·524
	Q	575·1	667·3	766·4	870·2	980·2	1092·	1340·
	C	0·713	0·724	0·735	0·745	0·754	0·760	0·777
0·10	V	1·549	1·635	1·720	1·798	1·873	1·947	2·088
	Q	472·8	549·4	631·7	717·4	807·7	903·4	1109·
	C	0·718	0·730	0·742	0·752	0·761	0·770	0·787
0·05	V	1·114	1·178	1·242	1·302	1·361	1·416	1·523
	Q	340·0	395·8	456·1	519·5	586·9	657·0	808·7
	C	0·730	0·744	0·758	0·770	0·782	0·792	0·812

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-

N=0·0275.

S per thousand.		Depths of water in feet. 2·	2·5	3·	3·5	4·	4·5	5·
0·8	V	2·266	2·646	2·989	3·299	3·596	3·865	4·128
	Q	281·0	413·4	564·9	733·2	920·6	1122·	1342·
	C	0·583	0·613	0·636	0·654	0·671	0·684	0·697
0·6	V	1·959	2·282	2·588	2·857	3·114	3·347	3·575
	Q	242·9	356·6	489·1	635·0	797·2	971·5	1162·
	C	0·582	0·612	0·636	0·654	0·671	0·684	0·697
0·5	V	1·785	2·085	2·359	2·607	2·843	3·055	3·268
	Q	221·3	325·8	445·8	579·4	727·8	886·7	1062·
	C	0·581	0·611	0·635	0·654	0·671	0·684	0·698
0·4	V	1·591	1·862	2·110	2·333	2·542	2·737	2·993
	Q	197·3	290·9	398·8	518·5	650·8	794·4	972·7
	C	0·579	0·610	0·635	0·654	0·671	0·685	0·698
0·3	V	1·373	1·613	1·824	2·020	2·206	2·374	2·535
	Q	170·3	252·0	344·7	448·9	564·7	689·1	823·9
	C	0·577	0·610	0·634	0·654	0·672	0·686	0·699
0·25	V	1·254	1·470	1·663	1·844	2·013	2·170	2·318
	Q	155·5	229·7	314·3	409·8	515·3	629·8	753·3
	C	0·577	0·609	0·633	0·654	0·672	0·687	0·700
0·2	V	1·118	1·313	1·485	1·649	1·804	1·944	2·076
	Q	138·6	205·2	280·7	366·5	461·8	564·3	674·7
	C	0·575	0·608	0·632	0·654	0·673	0·688	0·701
0·15	V	0·961	1·128	1·284	1·428	1·564	1·686	1·803
	Q	119·2	176·3	242·7	317·4	400·4	489·4	586·0
	C	0·571	0·605	0·631	0·654	0·674	0·689	0·703
0·10	V	0·778	0·919	1·047	1·165	1·279	1·379	1·480
	Q	96·47	143·6	197·9	258·9	327·4	400·3	481·0
	C	0·566	0·602	0·630	0·653	0·675	0·690	0·707
0·05	V	0·537	0·642	0·736	0·822	0·907	0·985	1·060
	Q	66·59	100·3	139·1	182·7	232·2	285·9	344·5
	C	0·552	0·594	0·626	0·652	0·677	0·697	0·716

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 60 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 5·5	6·	6·5	7·	7·5	8·	9·
0·8	V	4·366						
	Q	1573·						
	C	0·707						
0·6	V	3·787	3·989	4·182				
	Q	1364·	1580·	1808·				
	C	0·708	0·718	0·727				
0·5	V	3·462	3·647	3·823	3·990	4·154		
	Q	1247·	1523·	1652·	1871·	2103·		
	C	0·709	0·719	0·728	0·736	0·744		
0·4	V	3·101	3·267	3·429	3·573	3·726	3·859	4·130
	Q	1117·	1294·	1482·	1676·	1886·	2099·	2565·
	C	0·710	0·720	0·730	0·737	0·746	0·752	0·766
0·3	V	2·689	2·833	2·977	3·103	3·234	3·324	3·590
	Q	968·7	1122·	1287·	1455·	1637·	1808·	2229·
	C	0·711	0·721	0·732	0·739	0·748	0·755	0·769
0·25	V	2·459	2·597	2·722	2·841	2·959	3·075	3·287
	Q	885·8	1028·	1177·	1332·	1498·	1673·	2041·
	C	0·712	0·724	0·733	0·741	0·750	0·758	0·771
0·2	V	2·205	2·329	2·444	2·550	2·653	2·765	2·954
	Q	794·4	922·3	1056·	1196·	1343·	1504·	1834·
	C	0·714	0·726	0·736	0·744	0·754	0·762	0·775
0·15	V	1·915	2·025	2·125	2·224	2·321	2·408	2·579
	Q	689·9	801·9	918·5	1043·	1175·	1310·	1602·
	C	0·716	0·729	0·739	0·749	0·759	0·766	0·781
0·10	V	1·575	1·668	1·755	1·833	1·915	1·986	2·138
	Q	567·4	660·5	758·6	859·7	969·5	1080·	1328·
	C	0·721	0·735	0·747	0·756	0·767	0·774	0·793
0·05	V	1·132	1·203	1·267	1·327	1·393	1·447	1·561
	Q	407·8	476·4	547·7	622·4	705·2	787·2	969·4
	C	0·733	0·750	0·763	0·774	0·789	0·797	0·819

a nd cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-

N=0·0275.

S per thousand		Depths of water in feet. 2·	2·5	3·	3·5	4·	4·5	5·
0·8	V	2·279	2·664	3·009	3·329	3·632	3·906	4·174
	Q	308·1	482·8	659·0	856·4	1075·	1309·	1565·
	C	0·584	0·614	0·637	0·656	0·673	0·686	0·699
0·6	V	1·970	2·302	2·606	2·883	3·145	3·383	3·615
	Q	283·7	417·2	570·7	741·6	930·0	1134·	1356·
	C	0·583	0·613	0·637	0·656	0·673	0·686	0·699
0·5	V	1·795	2·099	2·379	2·632	2·871	3·092	3·305
	Q	258·5	380·4	521·0	677·1	849·8	1037·	1239·
	C	0·582	0·612	0·637	0·656	0·673	0·687	0·700
0·4	V	1·600	1·874	2·128	2·308	2·568	2·766	2·956
	Q	230·4	339·7	466·0	593·7	760·1	927·3	1109·
	C	0·580	0·611	0·637	0·656	0·673	0·687	0·700
0·3	V	1·381	1·622	1·840	2·039	2·228	2·399	2·564
	Q	198·9	294·0	403·0	524·5	659·5	804·3	961·5
	C	0·578	0·611	0·636	0·656	0·674	0·688	0·701
0·25	V	1·261	1·487	1·677	1·861	2·033	2·193	2·344
	Q	181·6	269·5	367·3	478·7	601·8	735·2	878·5
	C	0·578	0·613	0·635	0·656	0·674	0·689	0·702
0·2	V	1·124	1·321	1·498	1·665	1·821	1·964	2·099
	Q	164·3	239·4	328·1	428·3	538·6	658·4	787·0
	C	0·576	0·609	0·634	0·656	0·675	0·690	0·703
0·15	V	0·967	1·140	1·295	1·442	1·580	1·706	1·826
	Q	139·2	206·6	283·6	371·0	470·7	571·9	684·7
	C	0·572	0·607	0·633	0·656	0·676	0·692	0·706
0·10	V	0·782	0·925	1·056	1·155	1·292	1·397	1·500
	Q	112·6	167·7	231·3	297·1	382·4	468·3	562·5
	C	0·567	0·603	0·632	0·656	0·677	0·694	0·710
0·05	V	0·540	0·646	0·742	0·831	0·917	0·998	1·075
	Q	77·76	117·1	162·5	213·9	271·5	334·6	402·5
	C	0·553	0·595	0·628	0·655	0·680	0·701	0·720

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 70 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 5·5	6·	6·5	7·	7·5	8·	9·
0·8	V	4·418						
	Q	1835·						
	C	0·709						
0·6	V	3·831	4·038					
	Q	1591·	1841·					
	C	0·710	0·720					
0·5	V	3·502	3·692	3·877	4·048			
	Q	1454·	1684·	1928·	2182·			
	C	0·711	0·721	0·731	0·739			
0·4	V	3·137	3·306	3·477	3·631	3·777	3·918	
	Q	1303·	1508·	1729·	1957·	2195·	2445·	
	C	0·712	0·722	0·733	0·741	0·748	0·755	
0·3	V	2·724	2·871	3·019	3·153	3·284	3·407	3·654
	Q	1131·	1309·	1501·	1699·	1909·	2126·	2598·
	C	0·714	0·724	0·735	0·743	0·751	0·758	0·773
0·25	V	2·491	2·629	2·764	2·885	3·002	3·123	3·344
	Q	1034·	1199·	1374·	1555·	1745·	1949·	2378·
	C	0·715	0·726	0·737	0·745	0·752	0·761	0·775
0·2	V	2·234	2·361	2·479	2·591	2·702	2·808	3·006
	Q	927·7	1077·	1233·	1397·	1571·	1752·	2137·
	C	0·717	0·729	0·739	0·748	0·757	0·765	0·779
0·15	V	1·940	2·053	2·156	2·256	2·350	2·447	2·627
	Q	805·6	936·2	1072·	1216·	1366·	1527·	1868·
	C	0·719	0·732	0·742	0·752	0·760	0·770	0·786
0·10	V	1·595	1·690	1·779	1·862	1·942	2·022	2·178
	Q	662·3	770·6	884·6	1004·	1129·	1262·	1549·
	C	0·724	0·738	0·750	0·760	0·769	0·779	0·798
0·05	V	1·148	1·219	1·288	1·351	1·414	1·474	1·594
	Q	476·7	555·9	640·5	728·2	821·9	919·8	1133·
	C	0·737	0·753	0·768	0·780	0·792	0·803	0·826

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-

N=0·0275.

S per thousand.		Depths of water in feet. 2·	2·5	3·	3·5	4·	4·5	5·
0·8	V	2·290	2·677	3·031	3·356	3·657	3·941	4·212
	Q	375·6	552·1	754·8	980·8	1229·	1499·	1790·
	C	0·585	0·615	0·639	0·658	0·674	0·688	0·701
0·6	V	1·980	2·315	2·622	2·906	3·167	3·413	3·648
	Q	324·7	477·5	652·9	849·3	1064·	1298·	1550·
	C	0·584	0·614	0·638	0·658	0·674	0·688	0·701
0·5	V	1·804	2·110	2·393	2·653	2·891	3·128	3·335
	Q	295·9	435·2	595·8	775·3	971·4	1189·	1417·
	C	0·583	0·613	0·638	0·658	0·674	0·689	0·702
0·4	V	1·608	1·884	2·141	2·373	2·590	2·790	2·983
	Q	263·7	388·6	533·1	693·5	870·2	1061·	1268·
	C	0·581	0·612	0·638	0·658	0·675	0·689	0·702
0·3	V	1·388	1·629	1·850	2·055	2·246	2·420	2·591
	Q	227·6	336·0	460·7	600·6	754·7	920·2	1101·
	C	0·579	0·611	0·637	0·658	0·676	0·690	0·704
0·25	V	1·267	1·484	1·689	1·873	2·050	2·213	2·368
	Q	207·8	306·1	420·6	547·4	688·8	841·5	1006·
	C	0·579	0·610	0·637	0·657	0·676	0·691	0·705
0·2	V	1·129	1·326	1·509	1·675	1·837	1·982	2·122
	Q	185·2	273·5	375·7	489·5	617·2	753·7	901·9
	C	0·577	0·609	0·636	0·657	0·677	0·692	0·706
0·15	V	0·971	1·144	1·305	1·451	1·593	1·721	1·842
	Q	159·2	236·0	324·9	424·1	535·2	654·4	782·9
	C	0·573	0·607	0·635	0·657	0·678	0·694	0·708
0·1	V	0·786	0·930	1·062	1·185	1·303	1·409	1·513
	Q	128·9	191·8	264·4	346·3	437·8	535·8	643·0
	C	0·568	0·604	0·633	0·657	0·679	0·696	0·712
0·05	V	0·542	0·648	0·747	0·838	0·925	1·007	1·087
	Q	88·89	133·7	186·0	244·9	310·8	382·9	462·0
	C	0·554	0·595	0·630	0·657	0·682	0·703	0·723

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 80 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 5·5	6·	6·5	7·	7·5	8·	9·
0·8	V	4·461						
	Q	2098·						
	C	0·711						
0·6	V	3·869	4·079					
	Q	1819·	2105·					
	C	0·712	0·722					
0·5	V	3·536	3·729	3·919	4·093			
	Q	1663·	1924·	2203·	2493·			
	C	0·713	0·723	0·733	0·741			
0·4	V	3·168	3·340	3·514	3·665	3·825	3·970	
	Q	1490·	1723·	1976·	2232·	2510·	2795·	
	C	0·714	0·724	0·735	0·742	0·751	0·758	
0·3	V	2·751	2·900	3·052	3·187	3·325	3·458	3·694
	Q	1294·	1496·	1716·	1941·	2182·	2431·	2959·
	C	0·716	0·726	0·737	0·745	0·754	0·761	0·774
0·25	V	2·515	2·655	2·798	2·918	3·044	3·160	3·381
	Q	1183·	1370·	1570·	1777·	1998·	2225·	2708·
	C	0·717	0·728	0·739	0·747	0·756	0·763	0·776
0·2	V	2·256	2·381	2·505	2·620	2·733	2·837	3·044
	Q	1061·	1229·	1408·	1596·	1794·	1997·	2438·
	C	0·719	0·730	0·741	0·750	0·759	0·766	0·781
0·15	V	1·962	2·071	2·181	2·287	2·383	2·480	2·656
	Q	922·6	1069·	1226·	1393·	1564·	1746·	2127·
	C	0·722	0·733	0·745	0·756	0·764	0·773	0·787
0·1	V	1·613	1·707	1·800	1·885	1·956	2·048	2·205
	Q	758·5	880·8	1012·	1148·	1284·	1442·	1766·
	C	0·727	0·740	0·753	0·763	0·774	0·782	0·800
0·05	V	1·161	1·231	1·304	1·370	1·434	1·495	1·614
	Q	546·0	635·2	733·2	834·3	941·1	1052·	1293·
	C	0·740	0·755	0·771	0·784	0·796	0·807	0·828

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-

N=0·0275.

S per thousand.		Depths of water in feet. 2·	2·5	3·	3·5	4·	4·5	5·
0·8	V	2·294	2·685	3·042	3·368	3·683	3·965	4·241
	Q	422·1	620·9	848·7	1102·	1385·	1686·	2014·
	C	0·585	0·615	0·639	0·658	0·676	0·689	0·702
0·6	V	1·984	2·321	2·635	2·917	3·190	3·433	3·673
	Q	365·1	536·7	735·2	954·6	1199·	1460·	1745·
	C	0·584	0·614	0·639	0·658	0·676	0·689	0·702
0·5	V	1·808	2·115	2·405	2·663	2·912	3·139	3·358
	Q	332·7	489·1	671·0	871·5	1095·	1335·	1595·
	C	0·583	0·613	0·639	0·658	0·676	0·690	0·703
0·4	V	1·611	1·889	2·148	2·382	2·605	2·808	3·003
	Q	296·4	436·8	599·3	779·5	979·5	1194·	1426·
	C	0·581	0·612	0·638	0·658	0·676	0·690	0·703
0·3	V	1·393	1·633	1·857	2·063	2·258	2·439	2·608
	Q	256·3	377·6	518·1	675·1	849·0	1037·	1239·
	C	0·580	0·611	0·637	0·658	0·677	0·692	0·705
0·25	V	1·272	1·488	1·695	1·883	2·062	2·229	2·384
	Q	234·0	344·1	472·9	616·2	775·3	947·9	1132·
	C	0·580	0·610	0·637	0·658	0·677	0·693	0·706
0·2	V	1·131	1·329	1·516	1·684	1·848	1·997	2·136
	Q	208·1	307·3	423·0	551·1	694·8	849·2	1015·
	C	0·577	0·609	0·637	0·658	0·678	0·694	0·707
0·15	V	0·974	1·147	1·311	1·459	1·602	1·734	1·857
	Q	179·2	265·2	365·8	477·5	602·4	737·4	882·1
	C	0·573	0·607	0·636	0·658	0·679	0·696	0·710
0·10	V	0·789	0·933	1·067	1·191	1·312	1·420	1·525
	Q	145·2	215·8	297·7	389·8	493·3	603·9	724·4
	C	0·569	0·604	0·634	0·658	0·681	0·698	0·714
0·05	V	0·544	0·650	0·753	0·842	0·932	1·016	1·095
	Q	100·1	150·3	210·1	275·5	350·4	432·1	520·1
	C	0·555	0·595	0·632	0·658	0·684	0·706	0·725

V and Q are always in feet

TABLE XI.

charged (Q), and Coefficients (C) of Mean Velocity.

Trapezoidal Section, with Side Slopes of One to One.

width of 90 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 5·5	6·	6·5	7·	7·5	8·	9·
0·8	V	4·492						
	Q	2359·						
	C	0·712						
0·6	V	3·896	4·120					
	Q	2046·	2373·					
	C	0·713	0·724					
0·5	V	3·561	3·766	3·949	4·132			
	Q	1870·	2169·	2477·	2806·			
	C	0·714	0·725	0·734	0·743			
0·4	V	3·190	3·373	3·542	3·706	3·856	4·010	
	Q	1676·	1943·	2222·	2516·	2820·	3144·	
	C	0·715	0·726	0·736	0·745	0·752	0·760	
0·3	V	2·770	2·929	3·079	3·217	3·353	3·486	3·738
	Q	1455·	1687·	1931·	2184·	2452·	2733·	3331·
	C	0·717	0·728	0·739	0·747	0·755	0·763	0·777
0·25	V	2·536	2·682	2·819	2·945	3·074	3·187	3·421
	Q	1332·	1545·	1768·	2000·	2248·	2499·	3048·
	C	0·719	0·730	0·741	0·749	0·758	0·764	0·779
0·2	V	2·275	2·405	2·532	2·648	2·763	2·865	3·076
	Q	1195·	1385·	1588·	1798·	2020·	2246·	2741·
	C	0·721	0·732	0·744	0·753	0·762	0·768	0·783
0·15	V	1·978	2·094	2·204	2·308	2·406	2·504	2·688
	Q	1039·	1206·	1382·	1567·	1759·	1963·	2395·
	C	0·724	0·736	0·748	0·758	0·766	0·775	0·790
0·10	V	1·626	1·726	1·814	1·903	1·985	2·071	2·231
	Q	854·1	994·2	1138·	1292·	1452·	1624·	1988·
	C	0·729	0·743	0·754	0·765	0·774	0·785	0·803
0·05	V	1·172	1·247	1·316	1·384	1·445	1·511	1·634
	Q	615·6	718·3	825·5	939·7	1057·	1185·	1456·
	C	0·743	0·759	0·773	0·787	0·797	0·810	0·832

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-

N=0·0275.

S per thousand.		Depths of water in feet. 2·	3·	3·5	4·	4·5	5·	5·5
	V	1·811	2·412	2·676	2·922	3·151	3·376	3·582
0·5	Q	369·4	745·3	969·4	1216·	1482·	1772·	2078·
	C	0·583	0·639	0·659	0·676	0·690	0·704	0·715
	V	1·718	2·288	2·538	2·776	2·989	3·203	3·398
0·45	Q	350·5	707·0	919·4	1155·	1406·	1682·	1972·
	C	0·583	0·639	0·659	0·677	0·690	0·704	0·715
	V	1·617	2·153	2·393	2·617	2·823	3·024	3·208
0·4	Q	329·9	665·3	866·9	1089·	1328·	1588·	1861·
	C	0·582	0·638	0·659	0·677	0·691	0·705	0·716
	V	1·510	2·014	2·239	2·452	2·640	2·832	3·006
0·35	Q	308·0	622·3	811·1	1020·	1241·	1487·	1744·
	C	0·581	0·638	0·659	0·678	0·691	0·706	0·717
	V	1·396	1·865	2·072	2·270	2·448	2·627	2·787
0·3	Q	284·8	576·3	750·6	944·3	1151·	1379·	1617·
	C	0·580	0·638	0·659	0·678	0·692	0·707	0·718
	V	1·274	1·702	1·892	2·075	2·238	2·407	2·551
0·25	Q	259·9	525·9	685·4	863·2	1052·	1264·	1480·
	C	0·580	0·638	0·659	0·679	0·693	0·708	0·720
	V	1·136	1·520	1·692	1·856	2·007	2·150	2·288
0·2	Q	231·7	469·7	612·9	772·1	943·8	1129·	1328·
	C	0·578	0·637	0·659	0·679	0·695	0·709	0·722
	V	0·976	1·315	1·465	1·610	1·750	1·870	1·989
0·15	Q	199·1	406·3	530·7	669·8	822·9	981·8	1154·
	C	0·574	0·636	0·659	0·680	0·697	0·712	0·725
	V	0·792	1·072	1·197	1·318	1·428	1·536	1·638
0·10	Q	161·6	331·2	433·6	548·3	671·5	796·4	950·4
	C	0·570	0·635	0·659	0·682	0·699	0·716	0·731
	V	0·547	0·755	0·847	0·936	1·021	1·103	1·179
0·05	Q	111·6	233·3	306·8	389·4	480·1	579·1	684·1
	C	0·556	0·633	0·660	0·685	0·707	0·727	0·744

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 100 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 6·	6·5	7·	7·5	8·	9·	10.
0·5	V	3·785	3·974					
	Q	2407·	2751·					
	C	0·726	0·735					
0·45	V	3·591	3·776	3·949	4·114			
	Q	2284·	2614·	2958·	3317·			
	C	0·726	0·736	0·744	0·752			
0·4	V	3·390	3·565	3·726	3·884	4·040		
	Q	2156·	2468·	2791·	3131·	3491·		
	C	0·727	0·737	0·745	0·753	0·761		
0·35	V	3·176	3·339	3·490	3·638	3·789	4·060	
	Q	2020·	2311·	2614·	2933·	3274·	3983·	
	C	0·728	0·738	0·746	0·754	0·763	0·776	
0·3	V	2·948	3·096	3·240	3·377	3·517	3·763	4·002
	Q	1875·	2143·	2427·	2723·	3039·	3692·	4402·
	C	0·730	0·739	0·748	0·756	0·765	0·777	0·789
0·25	V	2·694	2·830	2·965	3·095	3·220	3·449	3·672
	Q	1713·	1959·	2221·	2495·	2782·	3383·	4039·
	C	0·731	0·740	0·750	0·759	0·767	0·780	0·793
0·2	V	2·421	2·544	2·666	2·783	2·891	3·105	3·305
	Q	1540·	1761·	1997·	2244·	2498·	3046·	3636·
	C	0·734	0·744	0·754	0·763	0·770	0·785	0·798
0·15	V	2·104	2·219	2·318	2·423	2·526	2·708	2·883
	Q	1338·	1536·	1736·	1954·	2182·	2657·	3371·
	C	0·737	0·749	0·757	0·767	0·777	0·791	0·804
0·10	V	1·735	1·826	1·916	2·004	2·089	2·248	2·395
	Q	1103·	1264·	1435·	1616·	1805·	2205·	2635·
	C	0·744	0·755	0·766	0·777	0·787	0·804	0·818
0·05	V	1·253	1·324	1·391	1·461	1·526	1·650	1·764
	Q	796·9	916·5	1042·	1178·	1318·	1619·	1940·
	C	0·760	0·774	0·787	0·801	0·813	0·834	0·852

and cubic feet per second.

TABLE XI.

Mean Velocities of Discharge (V), Quantities dis-

For Canals in Earth, Class IV., below the average, of

For a Bed-

N=0·0275.

S per thousand.		Depths of water in feet. 2·	3·	3·5	4·	4·5	5·	5·5
0·5	V	1·820	2·425	2·696	2·937	3·184	3·412	3·618
	Q	444·1	894·8	1165·	1457·	1784·	2133·	2497·
	C	0·584	0·640	0·661	0·676	0·693	0·707	0·717
0·45	V	1·726	2·300	2·558	2·787	3·020	3·237	3·432
	Q	421·1	848·7	1106·	1382·	1692·	2023·	2369·
	C	0·584	0·640	0·661	0·676	0·693	0·707	0·717
0·4	V	1·625	2·169	2·411	2·631	2·852	3·052	3·240
	Q	396·5	800·4	1042·	1305·	1598·	1908·	2236·
	C	0·583	0·640	0·661	0·677	0·694	0·707	0·718
0·35	V	1·517	2·026	2·256	2·462	2·667	2·856	3·035
	Q	370·1	747·6	975·2	1221·	1494·	1785·	2095·
	C	0·582	0·639	0·661	0·677	0·694	0·707	0·719
0·3	V	1·403	1·875	2·089	2·282	2·473	2·647	2·814
	Q	342·3	691·9	903·0	1132·	1385·	1654·	1942·
	C	0·581	0·639	0·661	0·678	0·695	0·708	0·720
0·25	V	1·271	1·713	1·906	2·086	2·261	2·420	2·576
	Q	310·1	632·1	823·9	1035·	1267·	1513·	1778·
	C	0·580	0·639	0·661	0·679	0·696	0·709	0·722
0·2	V	1·141	1·530	1·705	1·866	2·025	2·167	2·310
	Q	278·4	564·6	737·0	925·5	1135·	1354·	1594·
	C	0·579	0·638	0·661	0·679	0·697	0·710	0·724
0·15	V	0·982	1·322	1·477	1·621	1·759	1·888	2·009
	Q	239·6	487·8	638·4	804·0	985·5	1180·	1387·
	C	0·575	0·637	0·661	0·681	0·699	0·714	0·727
0·10	V	0·795	1·078	1·207	1·326	1·443	1·550	1·654
	Q	194·0	397·8	521·7	657·7	808·4	968·8	1142·
	C	0·570	0·636	0·662	0·682	0·702	0·718	0·733
0·05	V	0·549	0·760	0·855	0·941	1·032	1·114	1·194
	Q	134·0	280·4	369·6	466·7	578·2	696·3	824·2
	C	0·557	0·634	0·663	0·685	0·710	0·730	0·748

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 120 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 6·	6·5	7·	7·5	8·	9·	10·
0·5	V	3·824	4·023					
	Q	2890·	3308·					
	C	0·728	0·738					
0·45	V	3·633	3·821	3·991				
	Q	2747·	3142·	3548·				
	C	0·729	0·739	0·746				
0·4	V	3·430	3·603	3·768	3·935	4·094		
	Q	2593·	2963·	3350·	3763·	4192·		
	C	0·730	0·739	0·747	0·756	0·764		
0·35	V	3·213	3·374	3·529	3·685	3·840	4·113	
	Q	2429·	2774·	3137·	3524·	3932·	4775·	
	C	0·731	0·740	0·748	0·757	0·766	0·778	
0·3	V	2·979	3·129	3·276	3·422	3·564	3·817	4·067
	Q	2252·	2573·	2912·	3272·	3651·	4432·	5287·
	C	0·732	0·741	0·750	0·759	0·768	0·780	0·793
0·25	V	2·723	2·864	3·002	3·132	3·262	3·498	3·727
	Q	2059·	2355·	2669·	2995·	3340·	4061·	4845·
	C	0·733	0·743	0·753	0·761	0·770	0·783	0·796
0·2	V	2·438	2·575	2·699	2·812	2·929	3·148	3·354
	Q	1843·	2116·	2399·	2689·	2999·	3655·	4360·
	C	0·734	0·747	0·757	0·764	0·773	0·788	0·801
0·15	V	2·126	2·245	2·347	2·454	2·560	2·747	2·933
	Q	1607·	1846·	2086·	2347·	2621·	3189·	3813·
	C	0·739	0·752	0·760	0·770	0·780	0·794	0·809
0·10	V	1·793	1·848	1·939	2·030	2·116	2·283	2·437
	Q	1356·	1520·	1724·	1941·	2167·	2651·	3168·
	C	0·747	0·758	0·769	0·780	0·790	0·808	0·823
0·05	V	1·267	1·342	1·410	1·479	1·548	1·674	1·795
	Q	957·9	1103·	1253·	1414·	1585·	1944·	2334·
	C	0·763	0·778	0·791	0·804	0·817	0·838	0·857

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-

N=0·0275.

S per thousand.		Depths of water in feet. 2·	3·	3·5	4·	4·5	5·	5·5
0·5	V	1·826	2·433	2·714	2·958	3·198	3·428	3·646
	Q	518·6	1044·	1363·	1704·	2079·	2485·	2918·
	C	0·585	0·640	0·663	0·678	0·693	0·707	0·719
0·45	V	1·733	2·308	2·574	2·806	3·033	3·252	3·459
	Q	492·2	990·1	1293·	1616·	1972·	2358·	2768·
	C	0·585	0·640	0·663	0·678	0·693	0·707	0·719
0·4	V	1·631	2·175	2·427	2·649	2·864	3·071	3·266
	Q	463·2	933·1	1219·	1526·	1862·	2226·	2614·
	C	0·584	0·640	0·663	0·679	0·694	0·708	0·720
0·35	V	1·523	2·035	2·271	2·478	2·679	2·872	3·059
	Q	432·5	873·0	1141·	1427·	1742·	2082·	2448·
	C	0·583	0·640	0·663	0·679	0·694	0·708	0·721
0·3	V	1·408	1·881	2·102	2·298	2·484	2·663	2·836
	Q	399·9	806·9	1056·	1324·	1615·	1931·	2270·
	C	0·582	0·639	0·663	0·680	0·695	0·709	0·722
0·25	V	1·283	1·717	1·919	2·098	2·268	2·435	2·596
	Q	364·4	736·6	963·8	1208·	1475·	1765·	2077·
	C	0·581	0·639	0·663	0·680	0·695	0·710	0·724
0·2	V	1·146	1·534	1·717	1·879	2·031	2·181	2·328
	Q	325·5	658·1	862·4	1083·	1321·	1581·	1863·
	C	0·580	0·638	0·663	0·681	0·696	0·711	0·726
0·15	V	·9850	1·326	1·489	1·632	1·764	1·899	2·026
	Q	279·7	568·9	747·9	940·0	1147·	1377·	1621·
	C	0·576	0·637	0·664	0·683	0·698	0·715	0·729
0·10	V	·7977	1·083	1·215	1·334	1·447	1·560	1·667
	Q	226·5	464·6	610·2	768·4	940·9	1131·	1334·
	C	0·571	0·637	0·664	0·684	0·701	0·719	0·735
0·05	V	·5513	·7633	·8612	·9474	1·034	1·121	1·203
	Q	156·6	327·5	432·5	545·7	672·4	812·7	962·7
	C	0·558	0·635	0·665	0·687	0·709	0·731	0·750

V and Q are always in feet

TABLE XI.

charged (Q), and Coefficients (C) of Mean Velocity.

Trapezoidal Section, with Side Slopes of One to One.

width of 140 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 6·	6·5	7·	7·5	8·	9·	10·
0·5	V	3·856	4·059					
	Q	3378·	3865·					
	C	0·730	0·739					
0·45	V	3·663	3·846	4·026				
	Q	3209·	3662·	4143·				
	C	0·731	0·739	0·748				
0·4	V	3·458	3·634	3·801	3·971	4·133		
	Q	3029·	3460·	3911·	4457·	4893·		
	C	0·732	0·741	0·749	0·758	0·766		
0·35	V	3·240	3·400	3·568	3·720	3·872	4·154	
	Q	2838·	3238·	3671·	4115·	4584·	5571·	
	C	0·733	0·741	0·750	0·759	0·767	0·780	
0·3	V	3·003	3·156	3·305	3·453	3·594	3·856	4·111
	Q	2631·	3005·	3401·	3820·	4255·	5171·	6167·
	C	0·734	0·743	0·752	0·761	0·769	0·782	0·795
0·25	V	2·749	2·885	3·029	3·160	3·289	3·538	3·767
	Q	2408·	2747·	3117·	3496·	3894·	4744·	5651·
	C	0·736	0·743	0·755	0·763	0·771	0·786	0·798
0·2	V	2·466	2·594	2·723	2·838	2·957	3·185	3·389
	Q	2160·	2470·	2802·	3140·	3501·	4271·	5083·
	C	0·738	0·748	0·759	0·766	0·775	0·791	0·803
0·15	V	2·144	2·261	2·362	2·480	2·581	2·779	2·965
	Q	1878·	2153·	2430·	2744·	3056·	3727·	4448·
	C	0·741	0·753	0·760	0·773	0·781	0·797	0·811
0·10	V	1·769	1·864	1·957	2·049	2·140	2·306	2·466
	Q	1550·	1775·	2014·	2267·	2534·	3092·	3699·
	C	0·749	0·760	0·771	0·782	0·793	0·810	0·826
0·05	V	1·279	1·354	1·424	1·494	1·563	1·695	1·815
	Q	1120·	1289·	1465·	1653·	1851·	2273·	2723·
	C	0·766	0·781	0·794	0·806	0·819	0·842	0·860

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-width

N=0·0275.

S per thousand.		Depths of water in feet. 2·	3·	4·	4·5	5·	5·5	6·
0·5	V	1·829	2·442	2·975	3·217	3·451	3·666	3·878
	Q	592·6	1194·	1952·	2381·	2847·	3337·	3862·
	C	0·585	0·641	0·680	0·695	0·709	0·720	0·731
0·45	V	1·736	2·317	2·823	3·052	3·273	3·483	3·683
	Q	562·5	1133·	1852·	2259·	2700·	3170·	3668·
	C	0·585	0·641	0·680	0·695	0·709	0·721	0·732
0·4	V	1·633	2·184	2·662	2·877	3·086	3·284	3·477
	Q	529·1	1068·	1746·	2130·	2546·	2989·	3463·
	C	0·584	0·641	0·680	0·695	0·709	0·721	0·733
0·35	V	1·525	2·043	2·489	2·692	2·814	3·076	3·257
	Q	494·1	999·0	1633·	1993·	2322·	2800·	3244·
	C	0·583	0·641	0·680	0·695	0·709	0·722	0·734
0·3	V	1·410	1·889	2·308	2·496	2·677	2·852	3·020
	Q	456·8	923·7	1514·	1848·	2209·	2596·	3008·
	C	0·582	0·640	0·681	0·696	0·710	0·723	0·735
0·25	V	1·285	1·724	2·107	2·278	2·447	2·610	2·764
	Q	416·3	843·0	1382·	1686·	2019·	2376·	2753·
	C	0·581	0·640	0·681	0·696	0·711	0·725	0·737
0·2	V	1·147	1·539	1·887	2·040	2·192	2·342	2·412
	Q	371·6	752·6	1238·	1510·	1808·	2132·	2402·
	C	0·580	0·639	0·682	0·697	0·712	0·727	0·739
0·15	V	·9867	1·331	1·637	1·772	1·909	2·035	2·156
	Q	319·7	650·9	1074·	1312·	1575·	1852·	2147·
	C	0·576	0·638	0·683	0·699	0·716	0·730	0·742
0·10	V	·8828	1·087	1·341	1·443	1·567	1·677	1·779
	Q	286·0	531·5	880·4	1068·	1293·	1526·	1772·
	C	0·571	0·638	0·685	0·703	0·720	0·736	0·750
0·05	V	·5519	·7664	·9522	1·041	1·128	1·210	1·289
	Q	178·8	374·8	624·6	770·6	930·6	1101·	1284·
	C	0·558	0·636	0·688	0·711	0·733	0·751	0·768

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 160 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 6·5	7·	7·5	8·	9·	10·	12·
0·5	V	4·075						
	Q	4410·						
	C	0·740						
0·45	V	3·872	4·050					
	Q	4082·	4734·					
	C	0·741	0·749					
0·4	V	3·655	3·824	3·995				
	Q	3956·	4470·	5019·				
	C	0·742	0·750	0·759				
0·35	V	3·424	3·586	3·756	3·898			
	Q	3706·	4192·	4718·	5239·			
	C	0·743	0·752	0·760	0·768			
0·3	V	3·174	3·329	3·474	3·618	3·869	4·142	
	Q	3435·	3892·	4364·	4863·	5885·	7041·	
	C	0·744	0·754	0·762	0·770	0·780	0·796	
0·25	V	2·906	3·047	3·179	3·315	3·568	3·796	4·230
	Q	3145·	3562·	3994·	4455·	5427·	6453·	8731·
	C	0·746	0·756	0·764	0·773	0·788	0·799	0·820
0·2	V	2·609	2·740	2·855	2·981	3·212	3·421	3·815
	Q	2824·	3203·	3587·	4006·	4885·	5816·	7874·
	C	0·749	0·760	0·767	0·777	0·793	0·805	0·827
0·15	V	2·275	2·385	2·495	2·602	2·802	2·992	3·336
	Q	2462·	2788·	3134·	3497·	4262·	5086·	6886·
	C	0·754	0·764	0·774	0·783	0·799	0·813	0·835
0·10	V	1·874	1·970	2·063	2·157	2·326	2·488	2·782
	Q	2028·	2303·	2592·	2899·	3538·	4230·	5742·
	C	0·761	0·773	0·784	0·795	0·812	0·828	0·853
0·05	V	1·362	1·435	1·502	1·575	1·709	1·834	2·157
	Q	1474·	1678·	1887·	2117·	2599·	3118·	4452·
	C	0·782	0·796	0·807	0·821	0·844	0·863	0·896

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a ed-

N=0·

S per thousand.		Depths of water in feet. 2·	3·	4·	4·5	5·	5·5	6·
0·5	V	1·835	2·450	2·982	3·225	3·461	3·677	3·896
	Q	667·9	1345·	2195·	2678·	3201·	3751·	4348·
	C	0·586	0·642	0·680	0·695	0·709	0·720	0·732
0·45	V	1·741	2·324	2·829	3·060	3·283	3·493	3·696
	Q	633·7	1276·	2082·	2541·	3037·	3564·	4125·
	C	0·586	0·642	0·680	0·695	0·709	0·721	0·732
0·4	V	1·639	2·191	2·668	2·885	3·100	3·298	3·489
	Q	596·6	1203·	1964·	2395·	2868·	3365·	3894·
	C	0·585	0·642	0·680	0·695	0·710	0·722	0·733
0·35	V	1·530	2·047	2·495	2·703	2·900	3·089	3·269
	Q	556·9	1124·	1836·	2244·	2683·	3152·	3648·
	C	0·584	0·641	0·680	0·696	0·710	0·723	0·734
0·3	V	1·414	1·895	2·313	2·505	2·688	2·864	3·035
	Q	514·7	1040·	1702·	2080·	2486·	2922·	3387·
	C	0·583	0·641	0·681	0·697	0·711	0·724	0·736
0·25	V	1·289	1·729	2·112	2·288	2·457	2·622	2·778
	Q	469·2	949·2	1554·	1900·	2273·	2675·	3100·
	C	0·582	0·641	0·681	0·697	0·712	0·726	0·738
0·2	V	1·151	1·544	1·892	2·049	2·204	2·351	2·491
	Q	419·0	847·7	1393·	1701·	2039·	2399·	2780·
	C	0·581	0·640	0·682	0·698	0·714	0·728	0·740
0·15	V	·9896	1·336	1·641	1·779	1·914	2·045	2·166
	Q	360·2	733·5	1208·	1477·	1770·	2086·	2526·
	C	0·577	0·639	0·683	0·700	0·716	0·731	0·743
0·10	V	·8008	1·089	1·344	1·459	1·574	1·683	1·787
	Q	291·5	597·9	989·2	1211·	1465·	1717·	1994·
	C	0·572	0·638	0·685	0·703	0·721	0·737	0·751
0·05	V	·5540	·7677	·9556	1·045	1·132	1·214	1·294
	Q	201·7	421·5	703·3	867·6	1047·	1239·	1444·
	C	0·559	0·636	0·689	0·712	0·733	0·752	0·769

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 180 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 6·5	7·	7·5	8·	9·	10·	12·
0·5	V	4·102						
	Q	4973·						
	C	0·742						
0·45	V	3·896	4·073					
	Q	4723·	5332·					
	C	0·743	0·750					
0·4	V	3·678	3·885	4·014				
	Q	4459·	5085·	5645·				
	C	0·744	0·751	0·760				
0·35	V	3·446	3·606	3·759	3·920			
	Q	4177·	4720·	5286·	5896·			
	C	0·745	0·753	0·761	0·769			
0·3	V	3·194	3·347	3·490	3·638	3·912	4·174	
	Q	3872·	4381·	4908·	5472·	6654·	7931·	
	C	0·746	0·755	0·763	0·771	0·785	0·798	
0·25	V	2·923	3·064	3·194	3·334	3·590	3·825	4·260
	Q	3543·	4011·	4492·	5014·	6107·	7268·	9815·
	C	0·748	0·757	0·765	0·774	0·789	0·801	0·821
0·2	V	2·625	2·754	2·895	2·997	3·231	3·442	3·843
	Q	3182·	3605·	4085·	4507·	5496·	6540·	8854·
	C	0·751	0·761	0·768	0·778	0·794	0·806	0·828
0·15	V	2·291	2·398	2·506	2·622	2·819	3·011	3·364
	Q	2777·	3139·	3524·	3943·	4795·	5721·	7751·
	C	0·757	0·765	0·775	0·784	0·800	0·814	0·837
0·10	V	1·889	1·981	2·073	2·168	2·339	2·504	2·806
	Q	2290·	2593·	2915·	3261·	3979·	4758·	6465·
	C	0·764	0·774	0·785	0·796	0·813	0·829	0·855
0·05	V	1·374	1·444	1·509	1·585	1·720	1·848	2·086
	Q	1666·	1890·	2122·	2384·	2926·	3511·	4806·
	C	0·786	0·798	0·808	0·823	0·845	0·865	0·899

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-

N=0·0275.

S per thousand.		Depths of water in feet. 2·	3·	4·	4·5	5·	5·5	6·
0·5	V	1·837	2·453	2·988	3·237	3·468	3·692	3·912
	Q	742·1	1494·	2438·	2979·	3555·	4173·	4835·
	C	0·586	0·642	0·680	0·696	0·709	0·721	0·733
0·45	V	1·742	2·327	2·835	3·106	3·290	3·507	3·711
	Q	703·8	1417·	2313·	2858·	3372·	3964·	4593·
	C	0·586	0·642	0·680	0·696	0·709	0·722	0·733
0·4	V	1·640	2·194	2·673	2·895	3·107	3·306	3·503
	Q	662·6	1336·	2181·	2664·	3185·	3737·	4336·
	C	0·585	0·642	0·680	0·696	0·710	0·722	0·734
0·35	V	1·531	2·052	2·500	2·708	2·910	3·097	3·282
	Q	618·5	1250·	2040·	2492·	2983·	3500·	4057·
	C	0·584	0·642	0·680	0·696	0·711	0·723	0·735
0·3	V	1·415	1·900	2·318	2·511	2·694	2·871	3·047
	Q	571·7	1157·	1891·	2311·	2761·	3245·	3766·
	C	0·583	0·642	0·681	0·697	0·711	0·724	0·737
0·25	V	1·290	1·732	2·116	2·295	2·463	2·627	2·789
	Q	521·2	1055·	1727·	2112·	2525·	2969·	3447·
	C	0·582	0·641	0·681	0·698	0·712	0·726	0·739
0·2	V	1·152	1·549	1·895	2·056	2·209	2·361	2·502
	Q	465·4	943·3	1546·	1892·	2264·	2669·	3092·
	C	0·581	0·641	0·682	0·699	0·714	0·729	0·741
0·15	V	·9896	1·340	1·646	1·783	1·922	2·053	2·175
	Q	399·8	816·1	1343·	1641·	1970·	2320·	2688·
	C	0·577	0·640	0·684	0·700	0·717	0·732	0·744
0·10	V	·8019	1·092	1·347	1·464	1·580	1·690	1·795
	Q	324·0	665·0	1099·	1347·	1620·	1·797	2219·
	C	0·572	0·639	0·685	0·704	0·722	0·738	0·752
0·05	V	·5540	·7701	·9591	1·049	1·135	1·219	1·300
	Q	223·8	469·0	782·6	965·3	1163·	1378·	1607·
	C	0·559	0·637	0·690	0·713	0·734	0·753	0·770

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 200 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 6·5	7·	7·5	8·	9·	10·	12·
0·5	V	4·118						
	Q	5527·						
	C	0·743						
0·45	V	3·913	4·090					
	Q	5252·	5926·					
	C	0·744	0·751					
0·4	V	3·694	3·862	4·037				
	Q	4958·	5596·	6283·				
	C	0·745	0·752	0·761				
0·35	V	3·460	3·621	3·786	3·939			
	Q	4644·	5247·	5892·	6554·			
	C	0·746	0·754	0·763	0·770			
0·3	V	3·208	3·362	3·514	3·655	3·932	4·197	
	Q	4306·	4872·	5469·	6082·	7396·	8814·	
	C	0·747	0·756	0·765	0·772	0·786	0·799	
0·25	V	2·936	3·077	3·217	3·350	3·608	3·846	4·290
	Q	3941·	4459·	5006·	5574·	6787·	8077·	10914·
	C	0·749	0·758	0·767	0·775	0·790	0·802	0·823
0·2	V	2·637	2·766	2·888	3·012	3·248	3·461	3·870
	Q	3540·	4008·	4494·	5012·	6109·	7268·	9845·
	C	0·752	0·762	0·770	0·779	0·795	0·807	0·830
0·15	V	2·298	2·408	2·524	2·628	2·833	3·031	3·472
	Q	3084·	3489·	3928·	4373·	5329·	6365·	8833·
	C	0·757	0·766	0·777	0·785	0·801	0·816	0·839
0·10	V	1·894	1·990	2·088	2·179	2·354	2·520	2·826
	Q	2542·	2884·	3249·	3626·	4428·	5292·	7189·
	C	0·764	0·775	0·787	0·797	0·815	0·831	0·857
0·05	V	1·378	1·450	1·523	1·596	1·730	1·860	2·101
	Q	1850·	2101·	2370·	2656·	3254·	3906·	5345·
	C	0·786	0·799	0·812	0·825	0·847	0·867	0·901

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-

N=0·0275.

S per thousand.		Depths of water in feet. 2·	3·	4·	4·5	5·	5·5	6·
0·5	V	1·841	2·460	2·993	3·247	3·475	3·705	3·921
	Q	817·4	1646·	2682·	3280·	3909·	4595·	5317·
	C	0·587	0·643	0·680	0·697	0·709	0·722	0·733
0·45	V	1·747	2·334	2·839	3·081	3·350	3·514	3·724
	Q	775·7	1561·	2544·	3112·	3769·	4358·	5050·
	C	0·587	0·643	0·680	0·697	0·709	0·722	0·734
0·4	V	1·644	2·197	2·680	2·904	3·113	3·318	3·511
	Q	729·9	1470·	2401·	2934·	3502·	4115·	4761·
	C	0·586	0·642	0·681	0·697	0·710	0·723	0·734
0·35	V	1·535	2·055	2·507	2·716	2·923	3·108	3·289
	Q	681·5	1375·	2246·	2743·	3288·	3855·	4460·
	C	0·585	0·642	0·681	0·697	0·711	0·724	0·735
0·3	V	1·416	1·903	2·325	2·518	2·703	2·881	3·053
	Q	628·7	1273·	2083·	2543·	3041·	3573·	4140·
	C	0·583	0·642	0·682	0·698	0·712	0·725	0·737
0·25	V	1·349	1·737	2·122	2·303	2·471	2·634	2·795
	Q	599·0	1162·	1901·	2326·	2780·	3267·	3790·
	C	0·582	0·642	0·682	0·699	0·713	0·726	0·739
0·2	V	1·153	1·551	1·901	2·062	2·217	2·362	2·507
	Q	511·9	1038·	1703·	2083·	2494·	2929·	3397·
	C	0·581	0·641	0·683	0·700	0·715	0·728	0·741
0·15	V	·9930	1·341	1·629	1·786	1·925	2·054	2·183
	Q	440·9	897·1	1460·	1804·	2166·	2547·	2960·
	C	0·578	0·640	0·684	0·700	0·717	0·731	0·745
0·10	V	·8039	1·095	1·350	1·467	1·583	1·694	1·801
	Q	356·9	732·6	1210·	1482·	1781·	2101·	2442·
	C	0·573	0·640	0·686	0·704	0·722	0·738	0·753
0·05	V	·5555	·7720	·9605	1·052	1·138	1·220	1·305
	Q	246·6	516·5	860·6	1063·	1280·	1513·	1770·
	C	0·560	0·638	0·690	0·714	0·734	0·752	0·771

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 220 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 6·5	7·	7·5	8·	9·	10·	12·
0·5	V	4·129						
	Q	6079·						
	C	0·743						
0·45	V	3·922	4·107					
	Q	5774·	6526·					
	C	0·744	0·752					
0·4	V	3·703	3·876	4·053				
	Q	5452·	6159·	6915·				
	C	0·745	0·753	0·762				
0·35	V	3·469	3·631	3·802	3·954			
	Q	5107·	5770·	6487·	7212·			
	C	0·746	0·754	0·764	0·771			
0·3	V	3·216	3·371	3·529	3·671	3·950		
	Q	4735·	5357·	6021·	6696·	8141·		
	C	0·747	0·756	0·766	0·773	0·787		
0·25	V	2·943	3·090	3·230	3·365	3·624	3·869	4·314
	Q	4333·	4910·	5511·	6138·	7469·	8899·	12010·
	C	0·749	0·759	0·768	0·776	0·791	0·804	0·824
0·2	V	2·646	2·774	2·901	3·025	3·262	3·478	3·891
	Q	3896·	4408·	4950·	5518·	6723·	7999·	10833·
	C	0·753	0·762	0·771	0·780	0·796	0·808	0·831
0·15	V	2·307	2·414	2·533	2·640	2·846	3·046	3·082
	Q	3396·	3836·	4322·	4815·	5866·	7006·	8580·
	C	0·758	0·766	0·778	0·786	0·802	0·817	0·840
0·10	V	1·901	1·997	2·096	2·188	2·365	2·533	2·831
	Q	2799·	3173·	3576·	3991·	4874·	5826·	7882·
	C	0·765	0·776	0·788	0·798	0·816	0·832	0·858
0·05	V	1·381	1·456	1·531	1·602	1·738	1·869	2·114
	Q	2033·	2314·	2612·	2922·	3582·	4299·	5885·
	C	0·786	0·800	0·814	0·826	0·848	0·868	0·903

and cubic feet per second.

TABLE XI.

Mean Velocities of Discharge (V), Quantities dis-

For Canals in Earth, Class IV., below the average, of

For a Bed.

N=0·0275.

S per thousand.		Depths of water in feet. 2·	3·	4·	4·5	5·	5·5	6·
0·5	V	2·429	2·463	2·997	3·252	3·480	3·715	3·934
	Q	1176·	1796·	2925·	3577·	4263·	5016·	5807·
	C	0·587	0·643	0·680	0·697	0·709	0·723	0·734
0·45	V	1·747	2·336	2·847	3·085	3·306	3·525	3·732
	Q	845·5	1703·	2779·	3394·	4050·	4759·	5556·
	C	0·587	0·643	0·681	0·697	0·710	0·723	0·734
0·4	V	1·645	2·203	2·685	2·909	3·122	3·328	3·524
	Q	796·2	1606·	2621·	3200·	3824·	4493·	5201·
	C	0·586	0·643	0·681	0·697	0·711	0·724	0·735
0·35	V	1·536	2·057	2·510	2·720	2·924	3·118	3·299
	Q	743·4	1500·	2450·	2992·	3582·	4209·	4869·
	C	0·585	0·642	0·681	0·697	0·712	0·725	0·736
0·3	V	1·417	1·904	2·328	2·523	2·712	2·890	3·063
	Q	685·8	1388·	2272·	2775·	3322·	3902·	4521·
	C	0·583	0·642	0·682	0·698	0·713	0·726	0·738
0·25	V	1·291	1·739	2·125	2·305	2·478	2·642	2·804
	Q	624·8	1268·	2074·	2536·	3036·	3567·	4139·
	C	0·582	0·642	0·682	0·699	0·714	0·727	0·740
0·2	V	1·153	1·553	1·904	2·066	2·223	2·370	2·515
	Q	558·1	1132·	1858·	2273·	2723·	3200·	3712·
	C	0·581	0·641	0·683	0·700	0·716	0·729	0·742
0·15	V	·9936	1·343	1·650	1·794	1·931	2·061	2·190
	Q	480·9	979·0	1610·	1973·	2365·	2782·	3232·
	C	0·578	0·640	0·684	0·702	0·718	0·732	0·746
0·10	V	·8045	1·096	1·352	1·471	1·588	1·699	1·807
	Q	389·4	799·0	1320·	1618·	1945·	2294·	2667·
	C	0·573	0·640	0·686	0·705	0·723	0·739	0·754
0·05	V	·5561	·7726	·9633	1·055	1·141	1·226	1·309
	Q	269·2	563·2	940·2	1161·	1398·	1655·	1932·
	C	0·560	0·638	0·691	0·715	0·735	0·754	0·772

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 240 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 6·5	7·	7·5	8·	9·	10·	12·
0·5	V	4·137						
	Q	6627·						
	C	0·743						
0·45	V	3·870	4·116					
	Q	6200·	7117·					
	C	0·744	0·752					
0·4	V	3·710	3·885	4·062				
	Q	5943·	6717·	7540·				
	C	0·745	0·753	0·762				
0·35	V	3·476	3·639	3·810	3·964			
	Q	5569·	6292·	7072·	7865·			
	C	0·746	0·754	0·764	0·771			
0·3	V	3·222	3·378	3·537	3·679	3·965		
	Q	5162·	5841·	6566·	7299·	8886·		
	C	0·747	0·756	0·766	0·773	0·788		
0·25	V	2·949	3·096	3·236	3·372	3·638	3·881	
	Q	4724·	5353·	6007·	6690·	8153·	9725·	
	C	0·749	0·759	0·768	0·776	0·792	0·804	
0·2	V	2·651	2·783	2·907	3·032	3·275	3·492	3·910
	Q	4247·	4812·	5396·	6015·	7339·	8730·	11824·
	C	0·753	0·763	0·771	0·780	0·797	0·809	0·832
0·15	V	2·312	2·423	2·537	2·646	2·836	3·059	3·422
	Q	3704·	4189·	4709·	5250·	6355·	7648·	10348·
	C	0·758	0·767	0·777	0·786	0·803	0·818	0·841
0·10	V	1·905	2·005	2·103	2·194	2·382	2·543	2·854
	Q	3052·	3467·	3904·	4353·	5338·	6353·	8630·
	C	0·765	0·777	0·789	0·798	0·817	0·833	0·859
0·05	V	1·386	1·461	1·536	1·606	1·745	1·878	2·127
	Q	2220·	2526·	2851·	3186·	3911·	4695·	6432·
	C	0·787	0·801	0·815	0·826	0·849	0·870	0·905

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-

N=0·0275.

S per thousand.		Depths of water in feet. 3·	3·5	4·	4·5	5·	5·5	6·
0·5	V	2·465	2·744	3·004	3·256	3·490	3·721	3·934
	Q	1945·	2531·	3172·	3875·	4624·	5434·	6279·
	C	0·643	0·664	0·681	0·697	0·710	0·723	0·733
0·45	V	2·339	2·604	2·850	3·089	3·311	3·531	3·738
	Q	1845·	2402·	3010·	3677·	4387·	5156·	5966·
	C	0·643	0·664	0·681	0·697	0·710	0·723	0·734
0·4	V	2·204	2·455	2·687	2·912	3·126	3·333	3·529
	Q	1739·	2264·	2837·	3466·	4142·	4867·	5632·
	C	0·643	0·664	0·681	0·697	0·711	0·724	0·735
0·35	V	2·063	2·296	2·514	2·728	2·928	3·123	3·305
	Q	1628·	2117·	2655·	3247·	3880·	4560·	5275·
	C	0·643	0·664	0·681	0·698	0·712	0·725	0·736
0·3	V	1·906	2·126	2·327	2·529	2·786	2·895	3·064
	Q	1436·	1961·	2457·	3010·	3692·	4227·	4890·
	C	0·642	0·664	0·682	0·699	0·713	0·726	0·737
0·25	V	1·740	1·941	2·127	2·309	2·482	2·650	2·805
	Q	1373·	1790·	2246·	2748·	3289·	3870·	4477·
	C	0·642	0·664	0·682	0·699	0·714	0·728	0·739
0·2	V	1·556	1·788	1·906	2·068	2·226	2·376	2·519
	Q	1228·	1649·	2013·	2461·	2950·	3470·	4020·
	C	0·642	0·665	0·683	0·700	0·716	0·730	0·742
0·15	V	1·346	1·506	1·655	1·796	1·933	2·064	2·193
	Q	1062·	1389·	1748·	2137·	2561·	3014·	3500·
	C	0·641	0·665	0·685	0·702	0·718	0·732	0·746
0·10	V	1·097	1·230	1·353	1·475	1·590	1·701	1·808
	Q	865·5	1134·	1429·	1756·	2107·	2484·	2886·
	C	0·640	0·665	0·686	0·706	0·723	0·739	0·753
0·05	V	·7733	·8958	·9639	1·056	1·144	1·228	1·309
	Q	610·1	826·2	1018·	1257·	1516·	1793·	2089·
	C	0·638	0·666	0·691	0·715	0·736	0·754	0·771

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 260 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 6·5	7·	8·	9·	10·	12·	14·
0·5	V	4·150						
	Q	7189·						
	C	0·744						
0·45	V	3·943	4·129					
	Q	6830·	7717·					
	C	0·745	0·753					
0·4	V	3·722	3·897					
	Q	6447·	7284·					
	C	0·746	0·754					
0·35	V	3·486	3·650	3·973				
	Q	6039·	6822·	8518·				
	C	0·747	0·755	0·771				
0·3	V	3·232	3·394	3·688	3·975			
	Q	5599·	6343·	7907·	9623·			
	C	0·748	0·758	0·773	0·788			
0·25	V	2·957	3·106	3·379	3·646	3·895		
	Q	5122·	5805·	7245·	8827·	10516·		
	C	0·750	0·760	0·776	0·792	0·805		
0·2	V	2·660	2·789	3·038	3·282	3·506	3·920	
	Q	4608·	5213·	6513·	7946·	9466·	12796·	
	C	0·754	0·763	0·780	0·797	0·810	0·832	
0·15	V	2·319	2·431	2·651	2·864	3·066	3·436	3·777
	Q	4017·	4544·	5684·	6934·	8278·	11215·	14489·
	C	0·759	0·768	0·786	0·803	0·818	0·842	0·862
0·10	V	1·911	2·011	2·200	2·379	2·552	2·866	3·159
	Q	3310·	3759·	4939·	5760·	6890·	9355·	12118·
	C	0·766	0·778	0·799	0·817	0·834	0·860	0·883
0·05	V	1·390	1·466	1·609	1·750	1·885	2·135	2·366
	Q	2408·	2740·	3453·	4237·	5089·	6969·	9076·
	C	0·788	0·802	0·826	0·850	0·871	0·906	0·935

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-

N=0·0275.

S per thousand.		Depths of water in feet. 3·	3·5	4·	4·5	5·	5·5	6·
0·5	V	2·471	2·748	3·009	3·264	3·495	3·727	3·940
	Q	2098·	2727·	3418·	4179·	4980·	5852·	6761·
	C	0·644	0·664	0·681	0·698	0·710	0·723	0·733
0·45	V	2·340	2·606	2·853	3·096	3·315	3·535	3·743
	Q	1991·	2586·	3241·	3964·	4724·	5551·	6423·
	C	0·643	0·664	0·681	0·698	0·710	0·723	0·734
0·4	V	2·206	2·457	2·694	2·919	3·030	3·338	3·533
	Q	1873·	2438·	3060·	3737·	4318·	5242·	6063·
	C	0·643	0·664	0·682	0·698	0·711	0·724	0·735
0·35	V	2·063	2·298	2·520	2·731	2·928	3·126	3·310
	Q	1752·	2280·	2863·	3496·	4172·	4909·	5680·
	C	0·643	0·664	0·682	0·698	0·711	0·725	0·736
0·3	V	1·910	2·127	2·333	2·532	2·714	2·898	3·068
	Q	1622·	2111·	2650·	3242·	3867·	4551·	5265·
	C	0·643	0·664	0·682	0·699	0·712	0·726	0·737
0·25	V	1·742	1·943	2·132	2·312	2·485	2·654	2·809
	Q	1479·	1928·	2422·	2960·	3541·	4167·	4820·
	C	0·642	0·664	0·683	0·699	0·714	0·728	0·739
0·2	V	1·557	1·740	1·910	2·070	2·229	2·380	2·522
	Q	1322·	1726·	2170·	2650·	3176·	3737·	4328·
	C	0·642	0·665	0·684	0·700	0·716	0·730	0·742
0·15	V	1·347	1·507	1·657	1·798	1·936	2·069	2·196
	Q	1144·	1495·	1882·	2302·	2759·	3249·	3768·
	C	0·641	0·665	0·685	0·702	0·718	0·733	0·746
0·10	V	1·100	1·232	1·357	1·476	1·594	1·706	1·810
	Q	933·9	1222·	1542·	1890·	2271·	2679·	3106·
	C	0·641	0·666	0·687	0·706	0·724	0·740	0·753
0·05	V	·7751	·8711	·9321	1·058	1·148	1·231	1·312
	Q	658·1	864·4	1059·	1355·	1636·	1933·	2251·
	C	0·639	0·666	0·692	0·715	0·737	0·755	0·772

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Trapezoidal Section, with Side Slopes of One to One.

width of 280 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 6·5	7·	8·	9·	10·	12·	14·
0·5	V	4·156						
	Q	7740·						
	C	0·744						
0·45	V	3·948	4·135					
	Q	7352·	8307·					
	C	0·745	0·753					
0·4	V	3·727	3·903					
	Q	6941·	7841·					
	C	0·746	0·754					
0·35	V	3·491	3·656	3·985				
	Q	6501·	7345·	9181·				
	C	0·747	0·755	0·772				
0·3	V	3·237	3·398	3·699	3·988			
	Q	6028·	6826·	8523·	10373·			
	C	0·748	0·758	0·774	0·789			
0·25	V	2·963	3·111	3·389	3·659	3·904		
	Q	5518·	6250·	7808·	9517·	11322·		
	C	0·750	0·760	0·777	0·793	0·805		
0·2	V	2·664	2·797	3·047	3·293	3·517	3·935	
	Q	4961·	5619·	7020·	8565·	10199·	13788·	
	C	0·754	0·764	0·781	0·798	0·811	0·833	
0·15	V	2·322	2·438	2·659	2·873	3·076	3·449	3·793
	Q	4324·	4898·	6126·	7473·	8921·	12085·	15612·
	C	0·759	0·769	0·787	0·804	0·819	0·843	0·863
0·10	V	1·916	2·014	2·208	2·387	2·561	2·877	3·173
	Q	3568·	4046·	5087·	6209·	7427·	10081·	13060·
	C	0·767	0·778	0·799	0·818	0·835	0·861	0·884
0·05	V	1·394	1·468	1·613	1·756	1·891	2·142	2·376
	Q	2596·	2949·	3716·	4567·	5484·	7505·	9780·
	C	0·789	0·803	0·827	0·851	0·872	0·907	0·936

and cubic feet per second.

TABLE XI.

MEAN VELOCITIES OF DISCHARGE (V), QUANTITIES DIS-

For Canals in Earth, Class IV., below the average, of

For a Bed-

N=0·0275.

S per thousand.		Depths of water in feet. 3·	3·5	4·	4·5	5·	5·5	6·
0·5	V	2·472	2·749	3·014	3·267	3·503	3·731	4·251
	Q	2247·	2920·	3665·	4477·	5342·	6269·	7805·
	C	0·644	0·664	0·682	0·698	0·711	0·723	0·734
0·45	V	2·345	2·608	2·860	3·100	3·323	3·539	3·752
	Q	2132·	2770·	3478·	4248·	5068·	5946·	6889·
	C	0·644	0·664	0·682	0·698	0·711	0·723	0·735
0·40	V	2·211	2·459	2·700	2·923	3·138	3·341	3·542
	Q	2010·	2612·	3283·	4005·	4785·	5614·	6503·
	C	0·644	0·664	0·683	0·698	0·712	0·724	0·736
0·35	V	2·069	2·300	2·525	2·733	2·939	3·130	3·318
	Q	1881·	2443·	3070·	3745·	4482·	5259·	6092·
	C	0·644	0·664	0·683	0·698	0·713	0·725	0·737
0·3	V	1·912	2·129	2·341	2·535	2·725	2·902	3·076
	Q	1738·	2262·	2847·	3474·	4156·	4876·	5648·
	C	0·643	0·664	0·684	0·699	0·714	0·726	0·738
0·25	V	1·746	1·946	2·138	2·318	2·491	2·657	2·816
	Q	1587·	2067·	2600·	3176·	3799·	4464·	5170·
	C	0·643	0·665	0·684	0·700	0·715	0·728	0·740
0·2	V	1·558	1·741	1·915	2·087	2·234	2·382	2·529
	Q	1416·	1849·	2329·	2860·	3407·	4002·	4643·
	C	0·642	0·665	0·685	0·701	0·717	0·730	0·743
0·15	V	1·347	1·508	1·661	1·802	1·941	2·071	2·204
	Q	1224·	1602·	2020·	2469·	2960·	3480·	4047·
	C	0·641	0·665	0·686	0·703	0·719	0·733	0·748
0·10	V	1·101	1·233	1·362	1·480	1·596	1·708	1·812
	Q	1001·	1310·	1656·	2028·	2434·	2870·	3327·
	C	0·641	0·666	0·689	0·707	0·724	0·740	0·753
0·05	V	0·776	0·873	0·969	1·060	1·148	1·232	1·314
	Q	705·4	927·3	1178·	1452·	1751·	2070·	2413·
	C	0·639	0·667	0·693	0·716	0·737	0·755	0·772

V and Q are always in feet

TABLE XI.

CHARGED (Q), AND COEFFICIENTS (C) OF MEAN VELOCITY.

Section, with Side Slopes of One to One.

width of 300 feet.

N=0·0275.

S per thousand.		Depths of water in feet. 7	8	9	10	12	14	16
0·45	V	4·146						
	Q	8910						
	C	0·754						
0·4	V	3·915						
	Q	8413						
	C	0·755						
0·35	V	3·667	3·996					
	Q	7880	9847					
	C	0·756	0·773					
0·3	V	3·403	3·709	4·000				
	Q	7314	9139	11124				
	C	0·758	0·775	0·790				
0·25	V	3·115	3·399	3·665	3·916			
	Q	6695	8375	10193	12141			
	C	0·760	0·778	0·793	0·806			
0·2	V	2·801	3·056	3·299	3·525	3·949		
	Q	6019	7530	9174	10926	14785		
	C	0·764	0·782	0·798	0·811	0·834		
0·15	V	2·442	2·667	2·882	3·082	3·461	3·802	4·124
	Q	5247	6570	8015	9554	12959	16715	20849
	C	0·769	0·788	0·805	0·819	0·844	0·863	0·880
0·10	V	2·020	2·211	2·394	2·566	2·886	3·180	3·455
	Q	4341	5448	6658	7954	10805	13978	17468
	C	0·779	0·800	0·819	0·835	0·862	0·884	0·903
0·05	V	1·441	1·620	1·761	1·897	2·150	2·381	2·600
	Q	3096	3991	4898	5881	8050	10468	13148
	C	0·786	0·829	0·852	0·873	0·908	0·936	0·961

and cubic feet per second.

TABLE XII.

Reduction Multipliers.

Circular Arcs and Sectors.

Reduction of Gradients.

TABLE XII.

Additive Differences.

For obtaining Values of C′ in Class I., N=0·020, from those of C in Class II. of Earthwork.

R	S per thousand. 1·0	0·6	0·4	0·2	0·15	0·10	0·05
0·4	·077	·076	·076	·073	·071	·069	·062
0·5	·080	·080	·079	·077	·075	·072	·066
0·6	·083	·082	·082	·080	·078	·076	·070
0·7	·085	·085	·084	·082	·081	·079	·073
0·8	·087	·087	·086	·084	·083	·081	·076
0·9	·089	·088	·088	·086	·085	·083	·078
1·	·090	·090	·089	·087	·086	·084	·080
1·25	·092	·092	·092	·091	·090	·088	·084
1·5	·094	·094	·094	·093	·092	·089	·087
1·75	·096	·096	·095	·095	·094	·093	·091
2·	·097	·097	·097	·096	·095	·095	·093
2·25	·098	·098	·098	·097	·097	·097	·095
2·5	·099	·099	·099	·098	·098	·098	·096
2·75	·100	·099	·099	·099	·099	·099	·098
3·	·100	·100	·100	·100	·099	·100	·099
3·25	·100	·100	·101	·101	·101	·101	·100
3·5	·101	·101	·101	·101	·101	·101	·102
4·	·102	·101	·102	·102	·102	·102	·103
4·5	·102	·102	·103	·103	·103	·103	·105
5·	·103	·103	·103	·103	·104	·104	·106
5·5	·103	·103	·103	·104	·104	·105	·107
6	·104	·103	·104	·104	·105	·105	·108
7	·103	·104	·104	·105	·105	·107	·110
8	·104	·104	·105	·105	·106	·107	·111
9	·104	·105	·105	·106	·106	·108	·111
10	·105	·105	·105	·106	·107	·108	·112
12	·105	·105	·105	·107	·107	·109	·114
14	·105	·105	·105	·107	·108	·110	·114
16	·105	·105	·105	·107	·108	·110	·115
20	·105	·105	·106	·107	·108	·110	·115

Apply values of the fraction $\frac{C'}{C}$ to the values of V and Q, given in Table IX. for corresponding cases.

TABLE XII.

SUBTRACTIVE DIFFERENCES.

FOR OBTAINING VALUES OF C′ IN CLASS V., N=0·030, FROM THOSE OF C IN CLASS IV. OF EARTHWORK.

R	S per thousand. 1·0	0·6	0·4	0·2	0·15	0·10	0·05
0·4	·039	·038	·038	·037	·036	·034	·031
0·5	·041	·041	·040	·039	·038	·036	·034
0·6	·043	·042	·042	·041	·040	·038	·036
0·7	·044	·044	·043	·042	·042	·040	·037
0·8	·045	·045	·045	·043	·043	·041	·039
0·9	·046	·046	·045	·045	·044	·043	·040
1·	·047	·047	·047	·046	·045	·044	·042
1·25	·049	·048	·048	·048	·047	·046	·044
1·5	·050	·050	·050	·049	·049	·049	·046
1·75	·051	·051	·051	·050	·050	·050	·048
2·	·052	·052	·052	·052	·051	·051	·050
2·25	·053	·053	·052	·052	·052	·052	·051
2·5	·053	·053	·053	·053	·053	·053	·052
2·75	·054	·054	·054	·054	·054	·054	·053
3·	·055	·054	·054	·054	·054	·054	·054
3·25	·054	·055	·054	·055	·055	·055	·055
3·5	·055	·055	·055	·055	·055	·056	·056
4·	·056	·056	·056	·056	·056	·056	·057
4·5	·056	·056	·056	·057	·057	·057	·058
5·	·056	·057	·056	·057	·058	·058	·059
5·5	·057	·057	·057	·058	·058	·058	·060
6	·057	·057	·057	·058	·058	·058	·060
7	·057	·058	·058	·059	·059	·059	·062
8	·058	·058	·058	·059	·059	·060	·063
9	·058	·058	·059	·059	·060	·060	·063
10	·058	·058	·059	·060	·060	·061	·064
12	·058	·059	·059	·060	·060	·062	·065
14	·058	·059	·059	·060	·061	·062	·066
16	·059	·059	·059	·060	·061	·062	·066
20	·059	·059	0·59	·060	·061	·063	·067

Apply values of the fraction $\frac{C'}{C}$ to the values of V and Q, given in Table XI. for corresponding cases.

TABLE XII.

Reduction Multipliers for R and C.

For obtaining Values of R′, the Hydraulic Radius, for any Trapezoidal Section, from those of R given for Rectangular Sections in Table IV.

$\frac{b}{d}$ is the ratio of the bed-width to the depth of water.

$\frac{b}{d}$	Ratios of Side Slopes. Rect.	$\frac{1}{12}$ to 1.	$\frac{1}{3}$ to 1.	$\frac{1}{2}$ to 1.	$\frac{3}{4}$ to 1.	1 to 1	$1\frac{1}{4}$ to 1.	$1\frac{1}{2}$ to 1.	2 to 1.
0·5	1·0	1·179	1·242	1·828	2·083	2·254	2·332	2·435	2·514
0·75		1·105	1·160	1·536	1·692	1·793	1·855	1·894	1·931
1·		1·081	1·119	1·391	1·500	1·567	1·606	1·628	1·645
1·25		1·064	1·095	1·305	1·386	1·434	1·460	1·473	1·477
1·5		1·054	1·078	1·249	1·313	1·348	1·364	1·371	1·368
2·		1·040	1·058	1·180	1·222	1·243	1·249	1·249	1·236
2·5		1·032	1·046	1·140	1·170	1·183	1·184	1·179	1·162
3·		1·026	1·038	1·114	1·136	1·144	1·142	1·135	1·115
3·5		1·023	1·033	1·096	1·113	1·117	1·114	1·106	1·084
4·		1·020	1·029	1·082	1·096	1·099	1·093	1·085	1·062
4·5		1·016	1·025	1·072	1·085	1·084	1·078	1·069	1·046
5·		1·016	1·023	1·064	1·073	1·073	1·067	1·057	1·038
6		1·013	1·018	1·052	1·059	1·057	1·051	1·041	1·019
7		1·011	1·016	1·044	1·049	1·047	1·039	1·031	1·009
8		1·010	1·014	1·038	1·042	1·039	1·032	1·023	1·002
9		1·009	1·012	1·033	1·036	1·033	1·027	1·018	0·998
10		1·008	1·011	1·030	1·032	1·029	1·023	1·014	0·995
12		1·006	1·009	1·024	1·026	1·023	1·017	1·009	0·992
14		1·005	1·008	1·021	1·022	1·019	1·013	1·006	0·990
16		1·004	1·007	1·018	1·018	1·016	1·011	1·004	0·989
18		1·004	1·006	1·016	1·016	1·014	1·009	1·003	0·989
20		1·004	1·005	1·014	1·014	1·012	1·007	1·002	0·989
30		1·003	1·003	1·009	1·009	1·007	1·004	1·000	0·990
40		1·002	1·003	1·007	1·007	1·005	1·002	1·000	0·992
50		1·001	1·002	1·005	1·005	1·004	1·002	0·999	0·992
60		1·001	1·002	1·005	1·005	1·004	1·001	0·999	0·994
70		1·001	1·001	1·004	1·004	1·003	1·001	0·999	0·995
80		1·001	1·001	1·003	1·003	1·002	1·001	0·999	0·995
90		1·001	1·001	1·003	1·003	1·002	1·001	0·999	0·995
100	1·0	1·001	1·001	1·003	1·003	1·002	1·001	0·999	0·996

The value of C′ corresponding to R′ can be obtained from Table II. If the multiplier is not far from unity, it may be used to obtain C′ direct from the corresponding value of C given in Table VIII.

TABLE XII.

Reduction Multipliers for R and C.

For obtaining Values of R′, the Hydraulic Radius, for any Trapezoidal Section, from those of R given for Trapezoidal Sections having Side Slopes of One to One in Table IV.

$\frac{b}{d}$ is the ratio of the bed-width to the depth of water.

$\frac{b}{d}$	Ratios of Side Slopes. 0 to 1.	$\frac{1}{12}$ to 1.	$\frac{1}{8}$ to 1.	$\frac{1}{2}$ to 1.	$\frac{3}{4}$ to 1.	1 to 1.	$1\frac{1}{4}$ to 1.	$1\frac{1}{2}$ to 1.	2 to 1.
0·5	·4437	0·523	0·551	0·811	0·924	1·0	1·035	1·080	1·116
0·75	·5577	0·616	0·647	0·857	0·944		1·035	1·056	1·077
1·	·6382	0·690	0·714	0·888	0·957		1·025	1·039	1·050
1·25	·6974	0·742	0·764	0·910	0·967		1·018	1·027	1·030
1·5	·7418	0·782	0·800	0·927	0·974		1·012	1·017	1·015
2·	·8045	0·837	0·851	0·949	0·983		1·005	1·005	0·994
2·5	·8453	0·872	0·884	0·964	0·989		1·001	0·997	0·982
3·	·8741	0·897	0·907	0·974	0·993		0·998	0·992	0·975
3·5	·8953	0·916	0·919	0·979	0·996		0·997	0·989	0·971
4·	·9099	0·928	0·933	0·983	0·997		0·994	0·986	0·966
4·5	·9225	0·937	0·944	0·988	1·000		0·994	0·985	0·965
5·	·9320	0·947	0·953	0·991	1·000		0·994	0·984	0·964
6	·9461	0·958	0·963	0·995	1·002		0·994	0·984	0·963
7	·9551	0·966	0·970	0·997	1·002		0·992	0·984	0·963
8	·9625	0·972	0·976	0·999	1·003		0·993	0·984	0·964
9	·9681	0·977	0·980	1·000	1·003		0·994	0·985	0·966
10	·9718	0·980	0·983	1·001	1·003		0·994	0·985	0·967
12	·9775	0·983	0·986	1·001	1·003		0·994	0·986	0·970
14	·9814	0·986	0·989	1·002	1·003		0·994	0·987	0·972
16	·9843	0·988	0·991	1·002	1·002		0·995	0·988	0·974
18	·9862	0·990	0·992	1·002	1·002		0·995	0·989	0·976
20	·9881	0·992	0·993	1·002	1·002		0·995	0·990	0·978
30	·9930	0·996	0·996	1·002	1·002		0·997	0·993	0·983
40	·9950	0·997	0·998	1·002	1·002		0·997	0·995	0·987
50	·9960	0·997	0·998	1·001	1·001		0·998	0·995	0·988
60	·9960	0·997	0·998	1·001	1·001		0·997	0·995	0·990
70	·9970	0·998	0·998	1·001	1·001		0·998	0·996	0·992
80	·9980	0·999	0·999	1·001	1·001		0·999	0·997	0·993
90	·9980	0·999	0·999	1·001	1·001		0·999	0·997	0·993
100	·9980	0·999	0·999	1·001	1·001	1·0	0·999	0·997	0·994

The value of C′ corresponding to R′ can be obtained from Table II. If the multiplier is not far from unity, it may be used to obtain C′ direct from the corresponding value of C given in Table IX., X., or XI.

TABLE XII.

Reduction Multipliers for V.

For obtaining Values of V′, the Mean Velocity of Discharge, corresponding to any Trapezoidal Section from those of V given in Table VIII., for Rectangular Sections after reduction for the change of coefficient.

$\frac{b}{d}$ is the ratio of the bed-width to the depth of water.

$\frac{b}{d}$	Ratios of Side Slopes.								
	Rect.	$\frac{1}{12}$ to 1.	$\frac{1}{8}$ to 1.	$\frac{1}{2}$ to 1.	$\frac{3}{4}$ to 1.	1 to 1	$1\frac{1}{4}$ to 1.	$1\frac{1}{2}$ to 1.	2 to 1.
0·5	1·0	1·086	1·114	1·352	1·443	1·501	1·527	1·560	1·586
0·75		1·051	1·077	1·239	1·301	1·339	1·362	1·376	1·390
1·		1·040	1·058	1·179	1·225	1·252	1·267	1·276	1·283
1·25		1·032	1·046	1·142	1·177	1·197	1·208	1·214	1·215
1·5		1·027	1·038	1·118	1·146	1·161	1·168	1·171	1·170
2·		1·020	1·029	1·086	1·105	1·115	1·118	1·118	1·112
2·5		1·016	1·023	1·068	1·082	1·088	1·088	1·086	1·078
3·		1·013	1·019	1·055	1·066	1·070	1·069	1·065	1·056
3·5		1·011	1·016	1·047	1·055	1·057	1·055	1·052	1·041
4·		1·010	1·014	1·040	1·047	1·048	1·045	1·042	1·031
4·5		1·008	1·012	1·035	1·042	1·041	1·038	1·034	1·023
5·		1·008	1·011	1·031	1·036	1·036	1·033	1·028	1·019
6		1·006	1·009	1·026	1·029	1·028	1·025	1·020	1·009
7		1·005	1·008	1·022	1·024	1·023	1·019	1·015	1·004
8		1·005	1·007	1·019	1·021	1·019	1·016	1·011	1·001
9		1·004	1·006	1·016	1·018	1·016	1·013	1·009	0·999
10		1·004	1·005	1·015	1·016	1·014	1·011	1·007	0·997
12		1·003	1·004	1·012	1·013	1·011	1·008	1·004	0·996
14		1·002	1·004	1·010	1·011	1·009	1·006	1·003	0·995
16		1·002	1·003	1·009	1·009	1·008	1·005	1·002	0·994
18		1·002	1·003	1·008	1·008	1·007	1·004	1·001	0·994
20		1·002	1·002	1·007	1·007	1·006	1·003	1·001	0·994
30		1·001	1·001	1·004	1·004	1·003	1·002	1·000	0·995
40		1·001	1·001	1·003	1·003	1·002	1·001	1·	0·996
50		1·000	1·001	1·002	1·002	1·002	1·001	1·	0·996
60		1·	1·001	1·002	1·002	1·002	1·000	1·	0·997
70		1·	1·000	1·002	1·002	1·001	1·	1·	0·997
80		1·	1·	1·001	1·001	1·001	1·	1·	0·997
90		1·	1·	1·001	1·001	1·001	1·	1·	0·997
100	1·0	1·	1·	1·001	1·001	1·001	1·	1·	0·998

Here, $V' = \frac{C'}{C} \cdot V \times$ multiplier above given; while C, V, and Q, are given in Table VIII. For $\frac{C'}{C}$ see page 368.

TABLE XII.

Reduction Multipliers for V.

For obtaining Values of V′, the Mean Velocity of Discharge, corresponding to any Trapezoidal Section, from those of V given in Tables IX., X., and XI. for Trapezoidal Sections, having Side Slopes of One to One, after reduction for the change of coefficient.

$\frac{b}{d}$ is the ratio of the bed-width to the depth of water.

$\frac{b}{d}$	Ratios of Side Slopes.								
	0 to 1.	$\frac{1}{12}$ to 1.	$\frac{1}{8}$ to 1.	$\frac{1}{2}$ to 1.	$\frac{3}{4}$ to 1.	1 to 1.	$1\frac{1}{4}$ to 1.	$1\frac{1}{2}$ to 1.	2 to 1.
0·5	0·666	0·723	0·742	0·901	0·961	1·0	1·017	1·039	1·056
0·75	0·747	0·785	0·804	0·926	0·972		1·017	1·028	1·038
1·	0·799	0·831	0·845	0·942	0·978		1·012	1·019	1·025
1·25	0·835	0·861	0·874	0·954	0·983		1·009	1·013	1·015
1·5	0·861	0·884	0·894	0·963	0·987		1·006	1·008	1·007
2·	0·897	0·915	0·922	0·974	0·991		1·002	1·002	0·997
2·5	0·919	0·934	0·940	0·982	0·994		1·000	0·998	0·991
3·	0·935	0·947	0·952	0·987	0·996		0·999	0·996	0·987
3·5	0·946	0·957	0·959	0·989	0·998		0·998	0·994	0·985
4·	0·954	0·963	0·966	0·991	0·998		0·997	0·993	0·983
4·5	0·961	0·968	0·972	0·994	1·000		0·997	0·992	0·982
5·	0·965	0·973	0·976	0·995	1·000		0·997	0·992	0·982
6	0·973	0·979	0·981	0·997	1·001		0·997	0·992	0·981
7	0·978	0·983	0·985	0·998	1·001		0·996	0·992	0·981
8	0·981	0·986	0·988	0·999	1·001		0·996	0·992	0·982
9	0·984	0·988	0·990	1·000	1·001		0·997	0·992	0·983
10	0·986	0·990	0·991	1·000	1·001		0·997	0·992	0·983
12	0·989	0·991	0·993	1·000	1·001		0·997	0·993	0·985
14	0·991	0·993	0·994	1·001	1·001		0·997	0·993	0·986
16	0·992	0·994	0·995	1·001	1·001		0·997	0·994	0·987
18	0·993	0·995	0·996	1·001	1·001		0·997	0·994	0·988
20	0·994	0·996	0·996	1·001	1·001		0·997	0·995	0·989
30	0·996	0·998	0·998	1·001	1·001		0·998	0·996	0·991
40	0·997	0·998	0·999	1·001	1·001		0·998	0·997	0·993
50	0·998	0·998	0·999	1·000	1·000		0·999	0·997	0·994
60	0·998	0·998	0·999	1·	1·		0·999	0·997	0·995
70	0·998	0·999	0·999	1·	1·		0·999	0·998	0·996
80	0·999	0·999	0·999	1·	1·		0·999	0·998	0·996
90	0·999	0·999	0·999	1·	1·		0·999	0·998	0·996
100	0·999	0·999	0·999	1·	1·	1·0	0·999	0·998	0·997

Here, $V' = \frac{C'}{C} \cdot V \times$ multiplier above given; while C, V, and Q, are given in Tables IX., X., XI. For $\frac{C'}{C}$ see page 369.

TABLE XII.

Reduction Multipliers for Q.

For obtaining Values of Q′, the quantity discharged corresponding to any Trapezoidal Section, from those of Q given in Table VIII., for Rectangular Sections, after reduction for change of coefficient.

$\frac{b}{d}$ is the ratio of the bed-width to the depth of water.

$\frac{b}{d}$	Ratios of Side Slopes.								
	Rect.	$\frac{1}{12}$ to 1.	$\frac{1}{8}$ to 1.	$\frac{1}{2}$ to 1.	$\frac{3}{4}$ to 1.	1 to 1.	$1\frac{1}{4}$ to 1.	$1\frac{1}{2}$ to 1.	2 to 1.
0·5	1·0	1·267	1·392	2·704	3·607	4·503	5·341	6·240	7·930
0·75		1·168	1·256	2·065	2·602	3·124	3·630	4·128	5·097
1·		1·127	1·190	1·768	2·143	2·504	2·852	3·190	3·849
1·25		1·101	1·151	1·598	1·893	2·155	2·416	2·671	3·159
1·5		1·084	1·125	1·491	1·718	1·935	2·142	2·342	2·730
2·		1·062	1·093	1·357	1·518	1·672	1·816	1·956	2·224
2·5		1·050	1·074	1·282	1·406	1·523	1·631	1·738	1·940
3·		1·041	1·063	1·231	1·333	1·427	1·514	1·597	1·760
3·5		1·035	1·052	1·196	1·282	1·359	1·432	1·503	1·636
4·		1·031	1·046	1·170	1·242	1·310	1·372	1·433	1·546
4·5		1·027	1·040	1·150	1·213	1·272	1·325	1·368	1·478
5·		1·025	1·036	1·134	1·191	1·243	1·301	1·336	1·427
6		1·020	1·030	1·112	1·157	1·199	1·239	1·275	1·345
7		1·017	1·026	1·095	1·134	1·169	1·201	1·232	1·291
8		1·015	1·023	1·082	1·115	1·146	1·174	1·200	1·251
9		1·013	1·020	1·072	1·102	1·129	1·154	1·177	1·221
10		1·012	1·018	1·066	1·090	1·115	1·137	1·158	1·196
12		1·010	1·014	1·054	1·075	1·095	1·113	1·129	1·162
14		1·008	1·013	1·046	1·064	1·081	1·096	1·110	1·137
16		1·007	1·011	1·041	1·056	1·071	1·084	1·096	1·118
18		1·007	1·010	1·036	1·050	1·063	1·074	1·084	1·104
20		1·006	1·009	1·032	1·046	1·056	1·066	1·076	1·093
30		1·004	1·005	1·021	1·029	1·036	1·041	1·050	1·061
40		1·003	1·004	1·016	1·022	1·027	1·030	1·038	1·046
50		1·002	1·003	1·012	1·017	1·022	1·025	1·030	1·036
60		1·001	1·003	1·010	1·015	1·019	1·021	1·025	1·030
70		1·001	1·002	1·008	1·011	1·016	1·017	1·021	1·024
80		1·001	1·002	1·007	1·011	1·014	1·015	1·019	1·021
90		1·001	1·001	1·006	1·009	1·012	1·013	1·017	1·019
100	1·0	1·001	1·001	1·006	1·009	1·011	1·011	1·015	1·018

Here, $Q' = \frac{C'}{C} \cdot Q \times$ multiplier above given; while C, V, and Q, are given in Table VIII. For $\frac{C'}{C}$ see page 368.

TABLE XII.

Reduction Multipliers for Q.

For obtaining Values of Q′, the quantity discharged corresponding to any Trapezoidal Section, from those of Q given in Tables IX., X., XI., for Trapezoidal Sections, having Side Slopes of One to One, after reduction for change of coefficient.

$\frac{b}{d}$ is the ratio of the bed-width to the depth of water.

$\frac{b}{d}$	Ratios of Side Slopes. 0 to 1.	$\frac{1}{12}$ to 1.	$\frac{1}{8}$ to 1.	$\frac{1}{2}$ to 1.	$\frac{3}{4}$ to 1.	1 to 1.	$1\frac{1}{4}$ to 1.	$1\frac{1}{2}$ to 1.	2 to 1.
0·5	·2221	0·281	0·309	0·601	0·801	1·0	1·186	1·386	1·761
0·75	·3201	0·374	0·402	0·661	0·833		1·162	1·321	1·632
1·	·3994	0·450	0·475	0·706	0·856		1·139	1·274	1·537
1·25	·4640	0·511	0·534	0·743	0·874		1·121	1·239	1·466
1·5	·5168	0·560	0·581	0·771	0·888		1·107	1·210	1·411
2·	·5981	0·635	0·654	0·812	0·908		1·086	1·170	1·330
2·5	·6566	0·689	0·705	0·842	0·923		1·071	1·141	1·274
3·	·7008	0·730	0·745	0·863	0·934		1·061	1·119	1·233
3·5	·7358	0·762	0·774	0·880	0·943		1·054	1·106	1·204
4·	·7634	0·787	0·799	0·893	0·948		1·047	1·094	1·180
4·5	·7862	0·807	0·818	0·904	0·954		1·042	1·076	1·162
5·	·8045	0·825	0·833	0·912	0·958		1·039	1·075	1·148
6	·8340	0·851	0·859	0·927	0·965		1·033	1·063	1·122
7	·8554	0·870	0·878	0·937	0·970		1·027	1·054	1·104
8	·8726	0·886	0·893	0·944	0·973		1·024	1·047	1·092
9	·8857	0·897	0·903	0·949	0·976		1·022	1·042	1·081
10	·8969	0·908	0·913	0·956	0·978		1·020	1·039	1·073
12	·9132	0·922	0·926	0·963	0·982		1·016	1·031	1·061
14	·9251	0·933	0·938	0·968	0·984		1·014	1·027	1·052
16	·9337	0·941	0·945	0·973	0·986		1·012	1·023	1·044
18	·9407	0·948	0·951	0·976	0·988		1·010	1·020	1·030
20	·9470	0·953	0·956	0·977	0·989		1·009	1·019	1·035
30	·9653	0·969	0·970	0·986	0·993		1·005	1·014	1·024
40	·9737	0·977	0·978	0·990	0·995		1·003	1·011	1·019
50	·9785	0·981	0·982	0·991	0·995		1·003	1·008	1·014
60	·9814	0·982	0·984	0·991	0·996		1·002	1·006	1·011
70	·9842	0·985	0·986	0·993	0·996		1·002	1·006	1·009
80	·9862	0·987	0·988	0·993	0·997		1·001	1·005	1·007
90	·9881	0·989	0·989	0·995	0·998		1·001	1·005	1·007
100	·9891	0·990	0·990	0·995	0·998	1·0	1·000	1·004	1·007

Here, $Q' = \frac{C'}{C} \cdot Q \cdot \times$ multiplier above given; while C, V, and Q, are given in Tables IX., X., XI. For $\frac{C'}{C}$ **see page 369.**

TABLE XII.

Arcs of Circles, having a Diameter = 1; or Areas of Sectors of Circles, having a Radius = 1.

Deg.	Arc or Sector.	Deg.	Arc or Sector.	Deg.	Arc or Sector.	Deg.	Arc or Sector.	Deg.	Arc or Sector.
1	·00873	31	·27053	61	·53233	91	·79412	121	1·05592
2	·01745	32	·27925	62	·54105	92	·80286	122	1·06465
3	·02618	33	·28798	63	·54978	93	·81158	123	1·07338
4	·03491	34	·29671	64	·55851	94	·82030	124	1·08210
5	·04363	35	·30543	65	·56723	95	·82903	125	1·09083
6	·05236	36	·31416	66	·57596	96	·83776	126	1·09956
7	·06109	37	·32289	67	·58469	97	·84648	127	1·10828
8	·06981	38	·33161	68	·59341	98	·85521	128	1·11701
9	·07854	39	·34034	69	·60214	99	·86394	129	1·12574
10	·08727	40	·34907	70	·61087	100	·87266	130	1·13446
11	·09599	41	·35779	71	·61959	101	·88139	131	1·14319
12	·10472	42	·36652	72	·62832	102	·89012	132	1·15192
13	·11345	43	·37525	73	·63705	103	·89884	133	1·16064
14	·12217	44	·38397	74	·64577	104	·90757	134	1·16937
15	·13090	45	·39270	75	·65450	105	·91630	135	1·17810
16	·13963	46	·40143	76	·66323	106	·92502	136	1·18682
17	·14835	47	·41015	77	·67195	107	·93375	137	1·19555
18	·15708	48	·41888	78	·68068	108	·94248	138	1·20428
19	·16581	49	·42761	79	·68941	109	·95120	139	1·21300
20	·17453	50	·43633	80	·69813	110	·95993	140	1·22173
21	·18326	51	·44506	81	·70686	111	·96866	141	1·23046
22	·19199	52	·45379	82	·71559	112	·97738	142	1·23918
23	·20071	53	·46251	83	·72431	113	·98611	143	1·24791
24	·20944	54	·47124	84	·73304	114	·99484	144	1·25664
25	·21817	55	·47997	85	·74176	115	1·00356	145	1·26536
26	·22689	56	·48869	86	·75049	116	1·01229	146	1·27409
27	·23562	57	·49742	87	·75922	117	1·02102	147	1·28282
28	·24435	58	·50615	88	·76794	118	1·02974	148	1·29154
29	·25307	59	·51487	89	·77667	119	1·03847	149	1·30027
30	·26180	60	·52360	90	·78540	120	1·04720	150	1·30900

TABLE XII.

Arcs of Circles, having a Diameter =1;

or Areas of Sectors of Circles having a Radius =1.

Deg.	Arc or Sector.	Min.	Arc or Sector.	Min.	Arc or Sector.	Sec.	Arc or Sector.	Sec.	Arc or Sector.
151	1·31772	1	·00015	31	·00451	1	·000 002	31	·000 075
152	1·32645	2	·00029	32	·00465	2	·000 005	32	·000 078
153	1·33518	3	·00044	33	·00480	3	·000 007	33	·000 080
154	1·34390	4	·00058	34	·00494	4	·000 010	34	·000 082
155	1·35263	5	·00078	35	·00509	5	·000 012	35	·000 085
156	1·36136	6	·00087	36	·00524	6	·000 015	36	·000 087
157	1·37008	7	·00102	37	·00538	7	·000 017	37	·000 090
158	1·37881	8	·00116	38	·00553	8	·000 019	38	·000 092
159	1·38754	9	·00131	39	·00567	9	·000 022	39	·000 095
160	1·39626	10	·00145	40	·00582	10	·000 024	40	·000 097
161	1·40499	11	·00160	41	·00596	11	·000 026	41	·000 099
162	1·41372	12	·00175	42	·00611	12	·000 029	42	·000 102
163	1·42244	13	·00189	43	·00625	13	·000 031	43	·000 104
164	1·43117	14	·00204	44	·00640	14	·000 034	44	·000 107
165	1·43990	15	·00218	45	·00655	15	·000 036	45	·000 109
166	1·44862	16	·00233	46	·00669	16	·000 039	46	·000 112
167	1·45735	17	·00247	47	·00684	17	·000 041	47	·000 114
168	1·46608	18	·00262	48	·00698	18	·000 044	48	·000 116
169	1·47380	19	·00276	49	·00713	19	·000 046	49	·000 119
170	1·48353	20	·00291	50	·00727	20	·000 049	50	·000 121
171	1·49226	21	·00305	51	·00742	21	·000 051	51	·000 124
172	1·50098	22	·00320	52	·00756	22	·000 053	52	.000 126
173	1·50971	23	·00335	53	·00771	23	·000 056	53	·000 129
174	1·51844	24	·00349	54	·00785	24	·000 058	54	·000 131
175	1·52716	25	·00364	55	·00800	25	·000 061	55	·000 133
176	1·53589	26	·00378	56	·00814	26	·000 063	56	·000 136
177	1·54962	27	·00393	57	·00829	27	·000 065	57	·000 138
178	1·55334	28	·00407	58	·00844	28	·000 068	58	·000 141
179	1·56207	29	·00422	59	·00858	29	·000 070	79	·000 143
180	1·57080	30	·00436	60	·00873	30	·000 073	60	·000 145

TABLE XII.

Reduction of Gradients.

S per thousand.	One in	Feet per Mile.	One in	S per thousand.	Feet per Mile.
0·01	100 000	0·0528	100 000	0·0100	0·0528
0·02	50 000	0·1056	90 000	0·0111	0·0587
0·03	33 333	0·1584	80 000	0·0125	0·0660
0·04	25 000	0·2112	70 000	0·0143	0·0754
0·05	20 000	0·2640	60 000	0·0167	0·0880
0·06	16 666	0·3168	50 000	0·0200	0·1056
0·07	14 286	0·3696	40 000	0·0250	0·1320
0·08	12 500	0·4224	30 000	0·0333	0·1760
0·09	11 111	0·4752	20 000	0·0500	0·2640
0·1	10 000	0·528	10 000	0·1000	0·5280
0·15	6666	0·792	9500	0·1053	0·5557
0·2	5000	1·056	9000	0·1111	0·5866
0·25	4000	1·320	8500	0·1177	0·6211
0·3	3333	1·584	8000	0·1250	0·6600
0·35	2857	1·848	7500	0·1333	0·7040
0·4	2500	2·112	7000	0·1428	0·7543
0·45	2222	2·376	6500	0·1539	0·8123
0·5	2000	2·640	6000	0·1666	0·8800
0·55	1818	2·904	5500	0·1818	0·9600
0·6	1666	3·168	5000	0·2	1·0560
0·65	1538	3·332	4500	0·2222	1·1733
0·7	1429	3·696	4000	0·25	1·3200
0·75	1333	3·960	3500	0·2856	1·5086
0·8	1250	4·224	3000	0·3333	1·7600
0·85	1176	4·488	2500	0·4	2·1120
0·9	1111	4·752	2000	0·5	2·6400
0·95	1053	5·016	1500	0·6666	3·5200
1·	1000	5·28	1000	1·0	5·2800
1·5	666	7·92	900	1·111	5·8666
2·	500	10·56	800	1·250	6·6000
3·	333	15·84	700	1·428	7·543
4·	250	21·12	600	1·666	8·800
5·	200	26·40	500	2·	10·56
10·	100	52·8	100	10·	52·8
20·	50	105·6	50	20·	105·6

EXAMPLES AND CALCULATIONS.

I.—THE COMPUTING TABLES.

THE use of the various tables has been explained generally in the text, or explanation preceding them. In a few instances, however, examples, as well as details of calculation, are also necessary to serve as guides.

The formulæ and symbols given in Table I. require no further explanation beyond the notation set forth at the beginning of this book, opposite to page 1; and the use of the variables $M \,.\, \frac{M}{N}$ and $\frac{1 \cdot 811}{N}$ has been *exemplified* in calculating coefficients of mean velocity for a case of the Mississippi, under four values of N, on page 19.

The converse process of determining the value of N from a given mean velocity V and given values of R and S is not so often used for canals as for rivers. For this purpose the formula reduces itself to the form

$$N = \left\{ \frac{1 \cdot 811 \sqrt{R}}{cs} + \frac{R}{4} \cdot \left(\frac{c-s}{cs} \right)^2 \right\}^{\frac{1}{2}} - \frac{\sqrt{R}}{2} \cdot \frac{c-s}{cs}$$

where $s = 41 \cdot 6 + \frac{0 \cdot 00281}{S}$, which is the tabular quantity $\frac{M}{N}$, and $c = \frac{V}{\sqrt{RS}}$, which is 100 times the tabular quantity C; and where $\sqrt{RS}$ may be obtained from Table III. by dividing the quantities there given by 100.

Taking, *for example*, a case on the Danube. Given $V=2{\cdot}25$ feet per second, $R=12$ feet, $S=0{\cdot}00004$, or $0{\cdot}04$ per thousand, required N.

By Table I., $s=\dfrac{M}{N}=111{\cdot}85$.

By using Table III., $\sqrt{R}=3{\cdot}464$; and $c=\dfrac{V}{\sqrt{RS}}=\dfrac{2{\cdot}25}{0{\cdot}219}=102{\cdot}8$;

hence $cs=11498$; and $\dfrac{c-s}{cs}=-\dfrac{9{\cdot}05}{11498}$; therefore,

$$N=\left\{\frac{3{\cdot}464+1{\cdot}811}{11498}+3\left(\frac{1}{1275}\right)^2\right\}^{\frac{1}{2}}+1{\cdot}732\,.\,\frac{1}{1275}.$$

$$=\left\{\frac{1}{1833}+\left(\frac{1}{1275}\right)^2\times 3\right\}^{\frac{1}{2}}+0{\cdot}001\ 358$$

$$=\sqrt{0{\cdot}000\ 545\ 555+0{\cdot}000\ 001\ 845}+0{\cdot}001\ 858$$

$$=\sqrt{0{\cdot}000\ 5744}+0{\cdot}001\ 358$$

$$=0{\cdot}0234+0{\cdot}0013=\mathbf{0{\cdot}0247}.$$

This example, like that of the Mississippi, points to the futility of grouping rivers into three classes.

Table II. consists entirely of coefficients of mean velocity, arranged to suit round numbers in R and S, and all the useful classes of N. They are given for small values of R for culverts, and for larger values for canals. For any intermediate values of R or of S, a value of C can generally be interpolated simply by proportional parts; though sometimes a more accurate mode is to be preferred, which is described in the paragraph "Method of Interpolation," where an *example* is given, see page 41. The same method may be applied to intermediate values of S, as follows:—

For example.—Required C; when $N=0{\cdot}010$, cement and glazed materials; when $R=0{\cdot}5$ and $S=0{\cdot}25$ per thousand, taking the nearest quantities and their lateral differences.

S	C	Lateral differences.
0·4	1·3612	
		·0126
0·3	1·3486	
		·0238
0.2	1·3248	
		·0618
0·1	1·2630	

Here $n=\frac{1}{2}$ and $x=B+nb+n.\overline{n-1}\cdot\frac{c-a}{4}$

$$=1{\cdot}3248+\frac{1}{2}{\cdot}0238+\frac{1}{4}\cdot\frac{\cdot0618-0126}{4}$$

$$=1{\cdot}3248+{\cdot}0119+{\cdot}0031$$

$$=1{\cdot}3398$$

or, as it is only required in four figures, 1·340.

There is, however, generally no need to enter into exactitude as regards the inclination; although it is perfectly true that the chief advantage of the formula—in fact, that the discovery of Herr Kutter—principally consists in making allowance for varying inclination; and it hence should not be neglected. Yet there is considerable doubt as regards the necessity of much exactitude on this point. Hence, in dealing with these lateral differences for inclination, a rough per-centage of the difference is sufficient;—in this case 0·25 being intermediate half-way between 0·20 and 0·30, and the corrected portion of the difference being 150 out of 238, or about $\frac{5}{8}$ of it, the same ratio will be found to hold good approximately for the whole series of values of R at this degree of inclination, and can be applied in that rough way without practical error in most cases of canals, though not in rivers. Again, when the lateral differences are small, the coefficient for one inclination may be considered to hold good up to the next without any necessity for minute subdivision: for instance, when R=18, N=0·010, see page 64.

For S per thousand =1, C=1·6943

and for S per thousand=0·8, C=1·6929

here C=1·694 may be considered to hold good down to the next lower value 1·693; and so on.

The values of the expression $100\sqrt{RS}$ will be found to make a good point of departure, or datum line, for mean velocities having a value for C of 1;—while the value of 1 for C becomes also a good similar point of departure for coefficients of mean velocity. Table III., giving the former, admits of interpolation

much in the same way as Table II.; and, when mean velocities alone are required, these two tables together will give them for any values of R and S. Thus, *for example*, let $N=0.0275$; $R=3.25$; $S=0.10$ per thousand; we get $V=C.100\sqrt{RS}=$ $0.657+1.803=1.185$ feet per second. But if, in addition to this, the corresponding maximum velocity is required, it can be also obtained.

Thus, *continuing this example*, and referring to Table V., the nearest values to this mean velocity are,

	1·5	1·75
C		
0·65	1·079	1·259
0·70	1·102	1·285

in which can be interpolated by proportion

0·657   1·082   1·263; having a lateral difference ·181.

And as $1.185-1.082=.103$; and $\frac{.25\times.103}{.181}=.142$, the required maximum velocity $=1.5+.142=1.642$ feet per second.

Another example, illustrating the converse process of obtaining mean velocities from maximum velocities by the aid of Table V., is given in the paragraph on "Methods of Interpolation," pages 39 and 40.

In both of these cases a value of N is assumed or determined by observation beforehand to be suitable to the case. In the third case, however, both the maximum velocity and the mean velocity must be first determined by observation, and then, by using these two, the correct experimental value of C can be obtained from Table V.; and hence, also, the correct experimental value of N in the manner just applied in the example given for the Danube at Szob. The interpolation among the values of C in Table V. can be effected in the same manner as in the converse example just given.

Table IV. consisting entirely of sectional data, gives values of R the hydraulic radius, and A the sectional area, for various

sections of culverts and canals. Among the culverts, these values do not admit of interpolation, for intermediate depths of water between the full depth and the exact $\frac{2}{3}$ and $\frac{1}{3}$ of the total depth when full. A table of Arcs and Sectors is hence given in Table XII. to facilitate such calculations, and in the subsequent explanation of that table examples will be given.

The sectional data for canals comprise, first, those of rectangular sections; and, secondly, those of trapezoids with side slopes of one to one, the two types which are adhered to generally throughout these tables, although others can also be used, as will be hereafter explained. The values of A and R, given in Table IV. for these two types of section, correspond to various depths of water and widths of bed. The depths of water are chosen in accordance with the widths of bed and the actual requirements of canals as regards water. They are generally given for every 3 inches at the most useful depths, and for every 6 inches at the extremes; these will probably seldom require any interpolation, being sufficiently numerous, but still they admit of it. The widths of bed increase by 1 foot from 2 to 6 feet, by 2 feet from 6 to 20 feet, by 5 feet from 20 to 40, by 10 feet from 40 to 100, and by 20 feet from 100 to 300 feet, the extreme adopted; and, though these widths are numerous, they certainly do not give every bed-width that may occur; hence the occasional necessity for obtaining intermediate values of A and R for other widths of bed.

One means of so doing is to make use of inches instead of feet, and use the data for large canals; the results or values of R and A there given can then be dealt with as inches and square inches respectively, instead of feet and square feet. Another mode is to make use of yards instead of feet, and deal with the data given for small canals in the same manner; or to use multiples and sub-multiples, which will answer the purpose in the same way. Besides these methods, direct interpolation may be adopted for values of R.

For example.—Let the bed-width of a canal be 32 feet, and its depth of water 4·75 feet, its section rectangular; required the hydraulic radius.

At page 105 the nearest tabular values are

	$b=30$	$b=35$	Difference.
R	3·608	3·737	0·129

$$\text{hence } R=3{\cdot}608 + \tfrac{2}{5}\,0{\cdot}129 = 3{\cdot}660 \text{ feet.}$$

Checking this interpolation by direct calculation, R=3·663, and the error is small. In the same way for A the sectional area, the given values are

			Difference.
A	142·5	166·25	23·75

hence A=142·5+9·5= 152·0 square feet, which is exactly correct.

Although the direct calculation in this special case would be very short, and might be so in many others, the interpolation of tabular quantities is always to be preferred for practical purposes on account of the diminished risk of important error. The values of R and A for trapezoidal sections having side slopes of one to one may be interpolated in the same way.

If, however, values of R are required for other trapezoidal sections of various forms, reduction multipliers can be applied to the tabular values of R. For these see pages 366 and 367, in Table XII., as well as page 116, Table IV.

For example.—Let the bed-width of a canal be 32 feet, its depth of water 4·75 feet, its section a trapezoid with a batter of 1 in 12; required the hydraulic radius.

This section being more near to a rectangle than to a trapezoid with side slopes of one to one, we use the multipliers on page 366, or page 116, and depart from the corresponding rectangle, for which we already have (*see last example*) the value of R, 3·660 feet.

Here $\frac{b}{d}=\frac{32}{4{\cdot}75}=6{\cdot}7$, and the multiplier corresponding to this form of section, given on page 366, is 1·011.

$$\text{Hence } R=3{\cdot}660\times1{\cdot}011=3{\cdot}700 \text{ feet.}$$

And as for any side slope m to 1, the correction for sectional areas is md^2 when applied to rectangles; we also get

$$A=152+\tfrac{1}{12}\times(4{\cdot}75)^2=153{\cdot}88 \text{ square feet.}$$

Taking also a corresponding case.

For example.—Let the canal be 40 feet in width at bed, and 4·75 feet in depth of water, and the section a trapezoid with side slopes of $1\frac{1}{2}$ to 1.

As this section is nearer to a trapezoid with side slopes of one to one than it is to a rectangle, the reduction multipliers on page 367, will be more suitable than those on page 366.

Now, the corresponding quantities for a trapezoid of the tabular type are given at page 111, $R=3{\cdot}977$, $A=212{\cdot}56$; and as $\frac{b}{d}=\frac{40}{4{\cdot}75}=8{\cdot}4$, the multiplier corresponding to which, on page 367, is 0·984,

$$\text{hence } R=3{\cdot}977\times 0{\cdot}984=3{\cdot}913 \text{ feet.}$$

And as for any side slope m to 1, the correction for sectional areas is $\overline{m-1}\,.\,d^2$ when applied to areas of trapezoids having side slopes of one to one.

$$\text{Hence } A=212{\cdot}56+\overline{1\tfrac{1}{2}-1}\,.\,(4{\cdot}75)^2=223{\cdot}84 \text{ square feet.}$$

The computing tables, Tables I. to V. inclusive, thus allow separate parts of the general expressions for velocities and discharges to be computed separately, such as C, $100\sqrt{RS}$, R and A, combinations of which will give values of V and Q, and facilitate converse processes.

II.—THE TABLES OF FINAL RESULTS.

The Tables VI. to XI. inclusive, give values of C, V, and Q, at a glance, and hence generally require no exemplification. The Culvert Tables VI. and VII., for glazed and unglazed material, suit all the sizes or diameters of culverts in common use; and hence the quantities there given do not require interpolation for other diameters, except in very special instances.

They may, however, sometimes require interpolation for intermediate inclinations.

For example.—Required the mean velocity and the discharge of a glazed culvert, running just full, having an inclination of 7·25 per thousand, and being a Metropolitan Ovoid of dimensions 2′ 0″ × 3′ 0″.

The nearest quantities given in Table VI., pages 142 and 143, are

S	V	Diff.	Q	Diff.
6·0	8·393		38·56	
		·672		3·08
7·0	9·065		41·64	
		·627		2·89
8·0	9·692		44·53	
		·588		2·70
9·0	10·28		47·23	

$$\text{Hence } V = 9·065 + \tfrac{1}{4}\,·627 + \tfrac{1}{4}\left(-\tfrac{3}{4}\right)\cdot\frac{·588 - ·672}{4}$$

$$= 9·065 + ·157 + ·004 \qquad = 9·226 \text{ feet per second;}$$

$$\text{and } Q = 41·64 + \tfrac{1}{4}\,2·89 + \tfrac{1}{4}\left(-\tfrac{3}{4}\right)\cdot\frac{2·70 - 3·08}{4}$$

$$= 41·64 + ·72 + ·02 \qquad = 42·38 \text{ cubic feet per second.}$$

This example shows the comparative unimportance of the last term, and proves that interpolation by simple proportional parts is often quite sufficiently accurate. If, then, this plan be adopted, we simply take

$$V = 9·065 + ·25 \times ·627 = 9·222 \text{ feet per second;}$$

$$Q = 41·64 + ·25 \times 2·89 = 42·36 \text{ cubic feet per second.}$$

Cases occasionally occur in which the tabular round numbers are not used for diameters, as thus:—

For example.—Let a plain brick cylindrical culvert have a diameter of 28 inches and an inclination of 1·5 per thousand; required the mean velocity and the discharge. Referring to Table VII., page 159, we get

$$V = 3·014 + \tfrac{1}{3}\,0·237 = 3·09 \text{ feet per second;}$$

$$Q = 11·99 + \tfrac{1}{3}\,3·97 = 13·31 \text{ cubic feet per second.}$$

The converse process is equally simple.

For example.—Let it be required to determine a convenient diameter for a cylindrical culvert that shall discharge without pressure 30 cubic feet per second, when the conditions preclude a higher inclination than 2·5 per thousand.

First, if the culvert is to be in plain brickwork, refer to page 158, Table VII., for the nearest quantities for an inclination of 2·5 per thousand,

which are 26·66 for 2·75 feet diameter,
and 35·80 for 3· feet.

Hence the proportional difference is $=\frac{\cdot 25\times 3\cdot 34}{7\cdot 14}=117$;

and the required diameter is $2\cdot 75+\cdot 117=2\cdot 867$ feet.

Secondly, if the culvert is to be coated with very smooth cement, refer to page 132, Table VI., where the nearest quantities are

28·01 for 2·5 feet diameter,
and 36·16 for 2·75 feet diameter.

Hence the proportional difference$=\frac{\cdot 25\times 1\cdot 99}{8\cdot 15}=\cdot 061$;

and the required diameter is $2\cdot 5+\cdot 061=2\cdot 561$ feet.

This example illustrates the effect of smoothness of surface in reduction of diameter and size of culverts. For old or damaged brick, taken from the heading $N=0{\cdot}017$ in Table II. and the quantities in Table VII., modified by the fraction $\frac{C'}{C}$ or ratio of the new coefficient to the tabular one.

Table VIII. is constructed to suit aqueducts or portions of canal in rubble of rectangular section; and the quantities there given admit of interpolation in the following ways:—

1st. In accordance with intermediate inclinations.

2nd. With intermediate widths of bed.

3rd. With intermediate depths of water;

and in the converse process.

4th. With intermediate velocities.

5th. With intermediate discharges.

Examples of all such interpolations have been already given, either for cases of culverts or for sectional data of canals.

If the aqueduct in any required case be in very smooth cement, or in brickwork or ashlar, the suitable coefficient of mean velocity can be obtained from Table II., under the head of N=0·010, or N=0·013, as the case may require, and the fraction $\frac{C'}{C}$, or ratio which the correct coefficient bears to the tabular one, can then be applied to the tabular velocities and discharges.

For example.—Required the velocity and discharge of a small canal in ashlar, of rectangular section, 8 feet wide, with a depth of water of four feet, and having a hydraulic gradient or slope of 0·8 per 1000.

If this were in rubble, the quantities would be, see page 187, Table VIII., C=0·983, V=3·93, and Q=125·8; and, by referring to Table IV., the hydraulic radius is 2.

Now the corresponding coefficient for ashlar is 1·304. See Table II., page 68.

$$\text{Hence } V=\frac{1{\cdot}304}{0{\cdot}983}\times 3{\cdot}93=5{\cdot}21 \text{ feet per second.}$$

$$Q=\frac{1{\cdot}304}{0{\cdot}983}\times 125{\cdot}8=165{\cdot}8 \text{ cubic feet per second.}$$

If, again, the section, instead of being rectangular, is of any form of trapezoid, the reduction multipliers in Table XII. can be used to modify the tabular quantities C, V, and Q. The use of these multipliers will be exemplified with examples when treating of Table XII.

Tables IX., X., and XI., for canals in earth, in Classes II., III., and IV. respectively, are identical in form. These classes, having for their coefficients of roughness and irregularity N=0·0225, N=0·0250, and 0·0275 respectively, are the three most useful classes out of the five adopted in our classification; the average class, Class III., being a good fair mean, corresponding to the single earthwork category adopted by Bazin.

The quantities given in these three Tables, for trapezoidal sections having side slopes of one to one, admit of interpolation in the following ways:—

1st. In accordance with intermediate inclinations,
2nd. With intermediate widths of bed,
3rd. With intermediate depths of water;

and the converse process,

4th. In accordance with intermediate velocities,
5th. With intermediate quantities of discharge.

Examples of all such processes have been already given, either for cases of culverts, or for sectional data of canals, or coefficients of mean velocity and similar quantities in the computing tables; and a paragraph on "Methods of Interpolation," has also been given in the text preceding the tables. As a rule, simple interpolation by proportional parts is sufficiently accurate; when otherwise, an additional term dependent on the next higher and next lower differences must be made use of in the way previously explained. Next, if similar quantities be required for the two extreme classes of earthwork, Numbers I. and V., whose coefficients of roughness and irregularity are respectively **0·020** and **0·030**, the suitable coefficients of mean velocity may be obtained from Table II.; and the quantities given in any one of the three Tables, IX., X., or XI., can then be modified by the fraction $\frac{C'}{C}$, or the ratio which the correct coefficient bears to the tabular one. A corresponding example has been given for canals of rectangular section on page 386.

If, again, the form of section adopted has any other side slope than that adopted in the table of one to one, the reduction multipliers given in Table XII. may be used to modify the tabular quantities in the way subsequently explained when treating of Table XII.

III. THE REDUCTION MULTIPLIERS IN TABLE XII.

These are intended for application in cases where some side slope (having any ratio m to 1) is adopted, which does not occur in the Tables of Final Results for Canals. Table VIII. applying only to rectangular sections in rubble N=0·017, and Tables IX., X., and XI. applying only to trapezoidal sections with side slopes of one to one in earthwork of Classes II., III., and IV., where N respectively=0·0225, 0·0250, and 0·0275. The use of the reduction multipliers is hence limited to these classes, and to the hydraulic gradients or values of S per thousand there given, as well as to the bed-widths (b) and depths of water (d) adopted in those tables.

The first effect to be considered, of altering the side slope, from m' to m to 1 when b and d remain unaltered, is to change the original value of R, the hydraulic radius, of the section.

Then if the new value $R'=xR$,

$$x=\frac{R'}{R}=\frac{\frac{b}{d}+m}{\frac{b}{d}+2\sqrt{m^2+1}}\times\frac{\frac{b}{d}+2\sqrt{m'^2+1}}{\frac{b}{d}+m'};$$

and if we depart from rectangular sections, where $m'=0$ and $2\sqrt{m'^2+1}=2$; then—

$$x=\frac{\frac{b}{d}+m}{\frac{b}{d}+2\sqrt{m^2+1}}\times\left(1+\frac{2d}{b}\right)\cdot\cdot\cdot\cdot\cdot\ (\text{I.})$$

but if we depart from trapezoidal sections, having side slopes of one to one, where $m'=1$, and $2\sqrt{m'^2+1}=2{\cdot}828$, then—

$$x=\frac{\frac{b}{d}+m}{\frac{b}{d}+2\sqrt{m^2+1}}\times\frac{\frac{b}{d}+2{\cdot}828}{\frac{b}{d}+1}\cdot\cdot\cdot\ (\text{II.})$$

These values being applicable to any values of b and d, we can, by adopting various values of m, obtain corresponding values of x for any side slope; and these two sets of values or ratios will then be reduction multipliers for obtaining new values of R′ from those constituting the series of departure in either case.

Hence, if we take a special case given in any of the tables of Final Results for Canals, for which C, V, and Q are given, and corresponding to which the value of R is always given in Table IV., we can obtain new values, R′, C′, V′, Q′, corresponding to any other side slopes, in the following manner:—

Using values of x, the special reduction multipliers for R, we obtain—

$$R' = xR.$$

And making use of this new value R′, we can obtain by interpolation from Table II. a new value C′ corresponding to it, and suited to the same case as regards class and inclination; and also the values of $\frac{C'}{C}$; hence we can obtain—

$$V' = \frac{C'}{C}.V.y, \text{ where } y \text{ is a special multiplier, for V.};$$

$$\text{and } Q' = \frac{C'}{C}.Q.z, \text{ where } z \text{ is a special multiplier, for Q.}$$

These values, x, y, and z, are hence the three necessary multipliers for obtaining the new values of C′, V′, and Q′, from those of C, V, and Q given in the tables. But these values are different for the two cases, in one of which we depart from rectangular sections, and in the other we depart from trapezoidal sections having side slopes of one to one.

The values of x have been already given; and C′ is best found from Table II. If, however, it be preferred to calculate from C, then will $C' = x.C.\frac{M + \sqrt{R}}{M + \sqrt{xR}}$.

This calculation is generally needless; for if x happens to be nearly unity, as it often is, C′ may be taken $= xC$; or again, the fraction $\frac{C'}{C}$ is often so small that it may be neglected.

The value of y, the multiplier for V, is thus obtained,—

$$\frac{V'}{V}=\frac{C'.\,100\sqrt{R'S}}{C\,100\sqrt{RS}}=\frac{C'\sqrt{xR}}{C\sqrt{R}}$$

$$\therefore V'=\frac{C'}{C}.V.\sqrt{x}\text{; and hence } y=\sqrt{x} \text{ for either case.}$$

The value of z, the multiplier for Q, is thus obtained,—

$$\frac{Q'}{Q}=\frac{A'V'}{AV}=\frac{A'.V.C'\sqrt{x}}{AV.C}=\frac{C'}{C}\cdot\frac{A'\sqrt{x}}{A}$$

$$\therefore Q'=\frac{C'}{C}\times Q\times\frac{A'\sqrt{x}}{A}\text{; and hence } z=\frac{A'\sqrt{x}}{A}.$$

If we depart from rectangular sections, where $A=bd$,

$$\text{then } z=\frac{bd+md^2}{bd}.\sqrt{x}=\frac{\frac{b}{d}+m}{\frac{b}{d}}.\sqrt{x}.$$

And if we depart from trapezoidal sections with side slopes of one to one, where $A=bd+d^2$,

$$\text{then } z=\frac{bd+md^2}{bd+d^2}.\sqrt{x}=\frac{\frac{b}{d}+m}{\frac{b}{d}+1}.\sqrt{x}.$$

An alternative mode of obtaining the new value of Q' without the aid of the multipliers z will be suitable when the value of V' has been previously found; it is thus:—

Since $Q'=A'V'$; where V' is given.

And if we depart from rectangular sections,

$$A'=A+md^2.$$

And if we depart from trapezoidal sections with side slopes of one to one,

$$A'=A+\overline{m-1}\,.\,d^2,$$

The values of A being given for either case in Table IV., corresponding to any instance in any of the tables of Final Results;

we can thus easily modify them into values of A′, and applying the latter to the previously obtained values of V′, get the values of Q′. Examples of both of these processes will be hereafter given.

It should, however, be remembered by those designing canals and distributaries, that the side slope adopted for calculations of discharge and velocity should not be that of the bank above water-level, but that below the water-line, to which it will settle after fair wear, without any excessive velocity not suited to the soil. Under this condition, side slopes of earthwork below water, though originally constructed more shelving, generally settle down to about one to one; but if, on the contrary, the suitable limiting velocity is exceeded, a frequent but sad form of neglect, the effect will be to wear the side slopes more away at the foot, while alternations of low velocity may also cause deposit near water-level, and thus modify the side slope in course of time down to almost a half to one.

For example.—Required the mean velocity of discharge, the coefficient, and the quantity discharged in a channel 6 feet wide at the bottom, having side slopes of $\frac{1}{8}$th to 1, or a batter of 1 in 8, and a depth of water of 3 feet; when the hydraulic gradient is 2·00 per thousand, and the material in which it is constructed is rather old ashlar.

Obtaining the quantities for a rectangular section having corresponding data from page 186, Table VIII., we get

$$V=5{\cdot}11 \qquad Q=91{\cdot}98 \qquad C=0{\cdot}933.$$

And from page 105, Table IV., $A=18$; $R=1{\cdot}5$.

Also from pages 368, 370, and 372, Table XII., we obtain the multiplier corresponding to $\frac{6}{3}$, or 2, to be 1·058 for R; 1·029 for V; and 1·093 for Q.

Hence the new value $R'=1{\cdot}058\times1{\cdot}5=1{\cdot}587$.

And from page 72 the new corresponding value $C'=0{\cdot}943$, and $\frac{C'}{C}=1{\cdot}011$;

Therefore $V'=5{\cdot}11\times1{\cdot}029\times1{\cdot}011=5{\cdot}32$ feet per second

and $Q'=91{\cdot}98\times1{\cdot}093\times1{\cdot}011=101{\cdot}65$ cub. ft. per second.

Or by the alternative mode, $A'=A+md^2=18+\frac{1}{8}\times3^2=19\frac{1}{8}$,

and $Q'=5{\cdot}32\times19\frac{1}{8}=101{\cdot}65$.

For example.—Required the mean velocity of discharge, and the quantity discharged in a canal having a bottom width of 60 feet, side slopes of $1\frac{1}{2}$ to one, a depth of water of 3 feet, and an inclination of 0·15 per thousand, constructed in earth, in a condition above the average.

Assuming that this case will fall in Class II. of earthwork, N=0·0225, and obtaining the corresponding data for a similar section having side slopes of one to one,—

From page 112, Table IV.—A=189·0; R=2·76.

From page 234, Table IX.—C=0·775; V=1·577; Q=298·0.

From pages 369, 371, and 373, the multipliers are 0·990, 0·995, and 1·019.

Hence $R'=2·76\times0·990=2·73$; and as from page 79, $C'=0·7744-0·0013=0·773$, the fraction $\frac{C'}{C}$ may be neglected;

Therefore $V'=1·577\times0·995=1·569$ feet per second; and $Q'=298\times1·019=303·6$.

Or by the alternative mode $A'=A+\overline{m-1}\,d^2=189+4\frac{1}{2}=193·5$; and $Q'=1·5\times193·5=303·6$ cubic feet per second.

IV. THE CALCULATION OF HYDRAULIC RADII AND SECTIONAL AREAS OF PARTLY-FILLED CULVERTS.

The determination of values of R, the hydraulic radius, and A, the sectional area for culverts when partly filled, being sometimes rather troublesome, a few examples of such cases may be of use as a guide; the cases selected being those of various sections, filled to one-third and two-thirds, their depth adopted in Table IV. In such cases fractions of areas and of perimeters of circles are frequently used; and for such purposes the table of arcs and sectors in Table XII. has been specially constructed.

Taking the Pegtop section, the geometrical construction of which is as follows:—

Taking the transverse diameter$=2$; the long diameter, or total vertical depth,$=3$; the radius of the upper circle is 1·0, the radius of the invert is one-eighth the total depth$=0{\cdot}375$; and the straight sides, which are tangential to both upper and lower circles, are each equal to one-half the total depth$=1{\cdot}5$. For the complete section of the culvert, the sector of the upper circle extends beyond the semicircle to nearly 20° on each side; while the sector of the lower circle extends correspondingly to 20° less than the semicircle on each side; *i.e.* these two sectors are 220° and 140° respectively.

The full sectional area—

$A_1=$ Sector of 220° to radius $1\cdot+$ Sector of 140° to radius $0{\cdot}375+$ twice half depth $\times$ mean radius;

(Using the table of arcs and sectors),

$$=1{\cdot}91987\times 1^2+1{\cdot}22173\times(0{\cdot}375)^2+3\times 0{\cdot}6875=4{\cdot}15418.$$

And the complete perimeter—

$P_1=$ Arc of 220° to diameter $2+$ arc of 140° to diameter $0{\cdot}75+$ twice half depth.

$$=1{\cdot}91987\times 2+1{\cdot}22173\times 0{\cdot}75+3{\cdot}0=7{\cdot}75604.$$

And R_1 the hydraulic radius of the full section$=0{\cdot}536$.
The values of R_1 for any other diameter are proportional.

For the same section of culvert, when filled to two-thirds its depth.

$A_2=4{\cdot}15418-$ area of semicircle to radius 1

$$=4{\cdot}15418-1{\cdot}57080\times 1^2 \qquad =2{\cdot}58338$$

$P_2=7{\cdot}75604-$ arc of semicircle to diameter 2

$$=7{\cdot}75604-1{\cdot}57080\times 2 \qquad =4{\cdot}61444$$

And R_2 $\qquad =0{\cdot}560$

The values of R_2 for any other diameter are proportional.

For the same section of culvert, when filled to one-third the depth.

A_3 = sector of 140° to radius $0{\cdot}375 + \frac{3}{4}$ depth $\times \frac{R+3r}{4}$

$$=1{\cdot}22173 \times (0{\cdot}375)^2 + 0{\cdot}75 \times \frac{1+1{\cdot}125}{2} \qquad =0{\cdot}96868$$

P_3 = arc of 140° to diameter $0{\cdot}75 + \frac{13}{24}$ of the total depth

$$=1{\cdot}22173 \times 0{\cdot}75 + \frac{13}{24} \times 3 \qquad =2{\cdot}54130$$

And R_3 $=0{\cdot}381$

The values of R_3 for any other diameter are proportional.

Checking the above by calculating for the middle portion of the section.

Area = 2 sectors of 20° to radius $1 + \frac{3}{4}$ depth $\times \frac{3R+r}{4} = 0{\cdot}34907$

$$+0{\cdot}75 \times \frac{3{\cdot}375}{2} \qquad =1{\cdot}61470$$

and above, $2{\cdot}58338 - 0{\cdot}96868 = 1{\cdot}61470$

Perimeter = 2 arcs of 20° to diameter $2 + \frac{11}{24}$ total depth.

$$=0{\cdot}34907 \times 2 + \frac{11}{24} \times 3 \qquad =2{\cdot}07314$$

and above, $4{\cdot}61444 - 2{\cdot}54130 = 2{\cdot}07314$

Dealing in the same manner with Hawksley's Ovoid Section, the geometrical construction of which is thus,—

Taking the transverse diameter = 2, and the radius of the top semicircle = 1; the radius of each curved side of 45° is = 2, the radius of the invert of 90° is = 0·5858, and the total vertical depth is 2·5858. The sectors cut off by the trisection of the depth are 164° 12′ and 21°.

The respective areas are—

$$A_1 = 1{\cdot}5708 \times 1^2 + 0{\cdot}7854 \times 2^2 - \tfrac{1}{2}2 \times 1 + 0{\cdot}7854 \times (0{\cdot}5858)^2$$
$$=3{\cdot}9820$$

$$A_2 = 0{\cdot}138 \times 1{\cdot}99 + 0{\cdot}7854 \times 2^2 - \tfrac{1}{2}2 \times 1 + 0{\cdot}7854 \times {\cdot}3432 = 2{\cdot}6858$$

The middle area being more convenient to calculate, this is

$0{\cdot}138 \times 1{\cdot}99 + {\cdot}36652 \times 2^2 - {\cdot}38386 \times \frac{4}{3} + {\cdot}34 \times {\cdot}88578 \qquad = 1{\cdot}6580$

and A_3 the area of bottom portion $= 2{\cdot}6858 - 1{\cdot}6580 \quad = 1{\cdot}0278$

And the corresponding perimeters are—

$P_1 = 1{\cdot}57080 \times 2 + 0{\cdot}7854 \times 4 + 0{\cdot}7854 \times 1{\cdot}1716 \qquad = 7{\cdot}20337$

$P_2 = {\cdot}13788 \times 2 + 0{\cdot}7824 \times 4 + 0{\cdot}7854 \times 1{\cdot}1716 \qquad = 4{\cdot}33753$

and the perimeter of the middle third is

$= {\cdot}13788 \times 2 + {\cdot}36652 \times 4 \qquad = 1{\cdot}74184$

$P_3 = 4{\cdot}33753 - 1{\cdot}74184 \qquad = 2{\cdot}59569$

Hence the three corresponding hydraulic radii are

$R_1 = 0{\cdot}553,\ R_2 = 0{\cdot}620,\ R_3 = 0{\cdot}396.$

Checking the above by the top area and perimeter to two-thirds the depth,

area $= 1{\cdot}57080 \times 1^2 + {\cdot}36652 \times 2^2 - {\cdot}38386 + {\cdot}34 \times {\cdot}88578 = 2{\cdot}9542$

and $3{\cdot}9820 - 1{\cdot}0278 \qquad = 2{\cdot}9542$

erimeter $= 1{\cdot}57080 \times 2 + {\cdot}36652 \times 4 \qquad = 4{\cdot}60768$

and $7{\cdot}20337 - 2{\cdot}59569 \qquad = 4{\cdot}60768$

In the same way with Phillips' Metropolitan Ovoid, of which the geometrical construction is thus:—

Taking the transverse diameter=2, and the radius of the top semicircle=1, the extreme vertical depth is=3; the radius of the curved side=3; the radius of the invert is (one-sixth the depth, or) 0·5; and the depth from springing to bottom=2; the curved side has an arc of 36° 52′ 14″, and the invert an arc of 106° 16′. A trisection of the depth cuts off 19° 28′ of the side arc in the middle portion.

The respective areas, when full, two-thirds full, and one-third full, are

$A_1 = 1{\cdot}57080 \times 1^2 + {\cdot}64352 \times 3^2 + {\cdot}92735 \times (0{\cdot}5)^2 - 2 \times 1{\cdot}5 \quad = 4{\cdot}594$

$A_2 = 4{\cdot}5942 - 1{\cdot}5708 \quad = 3{\cdot}023$

and the area of the middle portion is

${\cdot}33975 \times 3^2 - 2 \times \frac{1}{2} \times 2 \times {\cdot}70693 + {\cdot}29307 \times {\cdot}82914 = 1{\cdot}887$

$A_3 = 3{\cdot}0234 - 1{\cdot}8868 = 1{\cdot}136 \quad = 1{\cdot}136$

The respective perimeters are

$P_1 = 1{\cdot}57080 \times 2 + {\cdot}64352 \times 6 + {\cdot}92735 \times 1 \quad = 7{\cdot}930$

$P_2 = \quad {\cdot}64352 \times 6 + {\cdot}92735 \quad = 4{\cdot}788$

Mid-portion perimeter $= {\cdot}33975 \times 6 = 2{\cdot}038$

P_3, lower third $\quad = 2{\cdot}75$

And the hydraulic radii corresponding are

$R_1 = 0{\cdot}579$, $R_2 = 0{\cdot}631$, and $R_3 = 0{\cdot}413$.

For similar culverts of other dimensions the areas can be reduced in the ratios of the squares of these diameters and the hydraulic radii in direct proportion to the diameters themselves.

The above cases show the utility of the Table of Arcs and Sectors given in Table XII., which can be applied to all similar purposes.

These three types of culvert-section, as well as the cylinder, are illustrated in the Frontispiece by figures of equal sectional area; whose relative diameters are thus,

Cylindrical Section - -	1·1286
Hawksley's Ovoid - -	1·0002 and 1·293
Metropolitan Ovoid - -	0·9331 and 1·3996
Pegtop Section - -	0·9813 and 1·4720.

They are divided to thirds of their actual longer diameters, and the dotted line on the Pegtop Section shows the gain in height of flushing that this has in comparison with the Metropolitan pattern of equal full sectional area. Its form is effective in preventing lodgment, and very convenient in calculations for intermediate depths.

For the converse process of finding the height to which a certain quantity of liquid, or a fixed sectional area will fill a cylindrical culvert, there are two practical modes:—

First.—Let a be the sectional area of the wet segment,
l its perimeter, or arc of the wet segment,
r the radius of the circle.

Then, if n be the angle of the sector, h the required height or depth, $=r-k=r\left(1-\cos\frac{n}{2}\right)$; . . . . . . (I.)

Example.—Let $a=0{\cdot}229$; $r=\frac{1}{2}$; $l=1{\cdot}231$;

Then by Table XII., pages 374, 375, $n=141°\ 0'\ 22''$, and $h=\frac{1}{2}(1-0{\cdot}3337)=0{\cdot}33\dot{3}$.

Secondly, without using cosines, $k.\sqrt{r^2-k^2}=l\times\frac{r}{2}-a$;

or, $$k^2=\frac{r^2}{2}+\sqrt{\frac{r^4}{4}-\left(\frac{l.r}{2}-a\right)^2} \qquad \text{(II.)}$$

Applying this to the same example,

$k^2=\cdot125+\sqrt{\cdot015625-(1{\cdot}231\times\frac{1}{4}-0{\cdot}229)^2}=0{\cdot}02793$,

$k=\cdot1671$; and the required depth $h=r-k=0{\cdot}333$.

It will be noticed that in either case the length of the arc is assumed; should this not have been previously determined, the height can only be obtained from values of a and r through the tedious process of solving an equation of a high degree. Thus, the approximate formula for the area of a segment, is

$$a=\frac{4h^{\frac{3}{2}}}{15}(2\sqrt{4d-3h}+\sqrt{d})\text{; where } d \text{ is the diameter.}$$

Putting $x=\frac{h}{d}$ this becomes $x^{\frac{3}{2}}(2\sqrt{4-3x}+1)=\frac{15a}{4d^2}$.

And putting $y=x^{\frac{1}{2}}=\left(\frac{h}{d}\right)^{\frac{1}{2}}$; $y^8-\frac{5}{4}y^6-\frac{5a}{8d^2}y^3+\frac{75a^2}{64d^4}=0$.

Numerical examples can be solved with this formula by Horner's method, or more readily by the aid of the dual-logarithms of Mr. Oliver Byrne; modes not very well suited to the daily wants of professional men; nor is there any necessity for adopting this method, as the length of the arc must be obtained to calculate the hydraulic radius; and in that case either of the two more practical methods above exemplified affords a more rapid solution.

V. THE TABLE OF GRADIENTS.

This table, for reducing gradients from one form to another, does not require any explanation. The practical convenience of keeping hydraulic gradients in the form of S, a varying fall, per thousand, or S per cent., in preference to the old method of recording gradients in the form of One in L, a varying length, more especially in designs and sections, becomes sufficiently obvious from use; it also has, like many similar useful changes, the advantage of exciting the aversion of the unreasoning, a compliment of the highest order. The equivalents of gradients in the form of falls per statute mile may also be occasionally useful.

LONDON
PRINTED BY W. H. ALLEN AND CO.

Demy 8vo., 560 pp., 28s.

HYDRAULIC MANUAL AND STATISTICS.

TABLE OF CONTENTS.

PART I.

MANUAL.

CHAPTER I.—EXPLANATION OF THE PRINCIPLES AND FORMULÆ ADOPTED IN CALCULATION AND APPLIED IN THE WORKING TABLES.

CHAPTER II.—ON FIELD OPERATIONS AND GAUGING; WITH BRIEF ACCOUNTS OF THE METHODS ADOPTED BY VARIOUS HYDRAULICIANS.

CHAPTER III.—PARAGRAPHS ON VARIOUS HYDRAULIC SUBJECTS.

WORKING TABLES.

MISCELLANEOUS TABLES AND DATA.

PART II.

STATISTICS.

INDIAN METEOROLOGICAL STATISTICS.

TABLE XI.—Part 6—*continued.*

Measures of Water Supply.

(Commercial equivalents at 62° F.)

A watering in cubic metres per hectare of		A watering in cubic feet per acre of	A watering in cubic feet per acre of		A watering in cubic metres per hectare of
100	=	8739·	1000	=	11·44
200	=	17479·	2000	=	22·88
300	=	26219·	3000	=	34·32
400	=	34958·	4000	=	45·76
500	=	43698·	5000	=	57·21
600	=	52437·	6000	=	68·65
700	=	61177·	7000	=	80·09
800	=	69916·	8000	=	91·53
900	=	78656·	9000	=	102·97
1000	=	87396·	10000	=	114·42

A watering of 1000 cubic metres per hectare = 3237 cubic yards per acre.

A watering of 1000 cubic yards per acre = 308·9 cubic metres per hectare.

A supply of 1·00 litre per second per hectare = 0·0874 cubic foot per second per acre.

A supply of 0·01 cubic foot per second per acre = 0·1144 litre per second per hectare.

Measures of Pressure.

(Commercial equivalents at 62° F.)

1 kilogramme per linear centimetre	= 5·598 lbs. per linear inch.
	= 67·176 lbs. per linear foot.
1 kilogramme per square centimetre	= 14·215 lbs. per square inch.
	= 2046·96 lbs. per square foot.
1 tonneau per square centimetre	= 6·3458 tons per square inch.
	= 913·79 tons per square foot.

1 pound per linear inch	= 0·1786	kilog. per linear	centimetre.
1 pound per linear foot	= 0·0149	,,	,,
1 pound per square inch	= 0·07035	kilog. per square	centimetre.
1 pound per square foot	= 0·00049	,,	,,
1 ton per square inch	= 0·1576	tonneaux per square	centimetre.
1 ton per square foot	= 0·0011	,,	,,

To be substituted for corresponding page in Hydraulic Manual.

TABLE XII.—Part 3.

Co-efficients of velocity of discharge for surfaces with a frictional co-efficient $f = 0{\cdot}01$, suitable to very smooth plastered channels in cement (Kutter), and to enamelled and glazed pipes.

For values of S.	For values of R in feet.											
	0·1	0·2	0·3	0·4	0·5	0·6	0·7	0·8	0·9	1·	1·25	1·5
·00005	0·68	0·88	1·00	1·10	1·17	1·23	1·29	1·33	1·37	1·41	1·49	1·55
·00010	0·78	0·98	1·10	1·19	1·26	1·32	1·37	1·41	1·45	1·48	1·54	1·60
·00015	0·83	1·03	1·15	1·24	1·30	1·36	1·40	1·44	1·48	1·51	1·57	1·62
·0002	0·86	1·05	1·17	1·26	1·32	1·38	1·42	1·46	1·49	1·52	1·58	1·63
·0003	0·89	1·08	1·20	1·29	1·35	1·40	1·44	1·48	1·51	1·54	1·59	1·64
·0004	0·91	1·10	1·22	1·30	1·36	1·41	1·45	1·49	1·52	1·55	1·60	1·64
·0005	0·92	1·11	1·23	1·31	1·37	1·42	1·46	1·49	1·52	1·55	1·61	1·65
·0006	0·92	1·12	1·23	1·31	1·37	1·42	1·46	1·50	1·53	1·55	1·61	1·65
·0008	0·93	1·13	1·24	1·32	1·38	1·43	1·47	1·50	1·53	1·56	1·61	1·65
·001 and upwards.	0·94	1·13	1·25	1·32	1·39	1·43	1·47	1·51	1·54	1·56	1·61	1·66

Applying the above to cylindrical glazed pipes, having gradients steeper than ·001, and neglecting very small pipes, for which experimental data are wanting, the co-efficient will remain 0·94 for all diameters up to 5 inches; while it becomes 1·00 for a diameter of 6″; 1·08 for 8″; 1·11 for 9″; 1·14 for 10″; and 1·19 for 12″.

To be substituted for corresponding page in Hydraulic Manual.

TABLE XII.—Part 3—*continued.*

Co-efficients of velocity of discharge for surfaces with a frictional co-efficient $f = 0{\cdot}01$, suitable to very smooth plastered channels in cement (Kutter), and to enamelled and glazed pipes.

For values of S.	For values of R in feet.											
	1·75	2·0	2·5	3·0	3·5	4·0	4·5	5	6	8	10	12
·00005	1·60	1·65	1·72	1·78	1·83	1·87	1·91	1·94	1·99	2·07	2·13	2·18
·00010	1·64	1·68	1·74	1·79	1·83	1·86	1·89	1·91	1·95	2·01	2·06	2·09
·00015	1·66	1·69	1·75	1·79	1·83	1·85	1·88	1·90	1·94	1·99	2·03	2·06
·0002	1·67	1·70	1·75	1·79	1·82	1·85	1·88	1·90	1·93	1·98	2·01	2·04
·0003	1·68	1·71	1·76	1·79	1·82	1·85	1·87	1·89	1·92	1·97	2·00	2·02
·0004	1·68	1·71	1·76	1·79	1·82	1·85	1·87	1·89	1·92	1·96	1·99	2·01
·0005	1·68	1·71	1·76	1·79	1·82	1·85	1·87	1·89	1·91	1·96	1·99	2·01
·0006	1·68	1·71	1·76	1·79	1·82	1·85	1·87	1·88	1·91	1·95	1·98	2·01
·0008	1·69	1·72	1·76	1·79	1·82	1·85	1·87	1·88	1·91	1·95	1·98	2·00
·001 and upwards.	1·69	1·72	1·76	1·79	1·82	1·85	1·86	1·88	1·91	1·95	1·98	2·00

To be substituted for corresponding page in Hydraulic Manual.

TABLE XII.—Part 3—*continued.*

Co-efficients of velocity of discharge for surfaces having a frictional co-efficient $f = 0{\cdot}013$, suitable to channels or culverts in brickwork or cut stone (Kutter), and to metal and unglazed stoneware pipes.

For values of S.	For values of R in feet.											
	0·1	0·2	0·3	0·4	0·5	0·6	0·7	0·8	0·9	1·0	1·25	1·50
0·00005	0·47	0·62	0·71	0·79	0·85	0·90	0·94	0·98	1·01	1·04	1·11	1·16
0·0001	0·54	0·69	0·79	0·86	0·92	0·96	1·00	1·04	1·07	1·10	1·15	1·20
0·00015	0·57	0·73	0·82	0·89	0·95	0·99	1·03	1·06	1·09	1·12	1·17	1·22
0·0002	0·59	0·74	0·84	0·91	0·96	1·01	1·05	1·08	1·11	1·13	1·18	1·23
0·0003	0·61	0·77	0·86	0·93	0·98	1·03	1·06	1·09	1·12	1·14	1·19	1·23
0·0004	0·63	0·78	0·87	0·94	0·99	1·03	1·07	1·10	1·13	1·15	1·20	1·24
0·0005	0·63	0·79	0·88	0·95	1·00	1·04	1·08	1·11	1·13	1·16	1·20	1·24
0·0006	0·64	0·79	0·88	0·95	1·00	1·04	1·08	1·11	1·14	1·16	1·21	1·24
0·0008	0·65	0·80	0·89	0·96	1·01	1·05	1·08	1·11	1·14	1·16	1·21	1·25
0·001 and upwards.	0·65	0·80	0·89	0·96	1·01	1·05	1·09	1·12	1·14	1·16	1·21	1·25

Applying the above to ordinary metal pipes, having gradients steeper than ·001, and neglecting very small pipes for which experimental data are wanting, the co-efficient will remain 0·65 for all diameters up to 5 inches; while it becomes 0·69 for a diameter of 6″; 0·76 for 8″; 0·79 for 9″; 0·81 for 10″; and 0·85 for 12″.

To be substituted for corresponding page in Hydraulic Manual.

TABLE XII.—Part 3—*continued.*

Co-efficients of velocity of discharge for surfaces having a frictional co-efficient $f = 0{\cdot}013$—*continued.*

(Kutter.)

For values of S.	For values of R in feet.											
	1·75	2·0	2·5	3·0	3·5	4·0	4·5	5·	6·	8·	10·	12·
0·00005	1·21	1·25	1·31	1·37	1·41	1·45	1·48	1·51	1·56	1·64	1·69	1·73
0·0001	1·24	1·27	1·33	1·37	1·41	1·44	1·46	1·49	1·53	1·58	1·62	1·66
0·00015	1·25	1·28	1·33	1·37	1·41	1·43	1·46	1·48	1·51	1·56	1·60	1·63
0·0002	1·26	1·29	1·34	1·38	1·41	1·43	1·45	1·47	1·51	1·55	1·59	1·61
0·0003	1·27	1·30	1·34	1·38	1·41	1·43	1·45	1·47	1·50	1·54	1·57	1·60
0·0004	1·27	1·30	1·34	1·38	1·40	1·43	1·45	1·47	1·49	1·54	1·57	1·59
0·0005	1·27	1·30	1·34	1·38	1·40	1·43	1·45	1·46	1·49	1·53	1·56	1·58
0·0006	1·28	1·30	1·34	1·38	1·40	1·43	1·45	1·46	1·49	1·53	1·56	1·58
0·0008	1·28	1·30	1·35	1·38	1·40	1·43	1·44	1·46	1·49	1·53	1·56	1·58
0·001 and upwards.	1·28	1·30	1·35	1·38	1·40	1·43	1·44	1·46	1·49	1·53	1·55	1·57

To be substituted for corresponding page in Hydraulic Manual.

TABLE XII.—Part 3—*continued*.

Co-efficients of velocity of discharge for surfaces having a frictional co-efficient $f = 0{\cdot}017$, suitable to channels or aqueducts in rubble (Kutter.)

For values of S.	For values of R in feet.											
	0·5	0·75	1·0	1·5	2·	3·	4·	5·	6·	8·	10·	12·
0·00005	0·61	0·70	0·77	0·87	0·94	1·04	1·12	1·17	1·22	1·29	1·34	1·38
0·0001	0·66	0·74	0·81	0·90	0·96	1·05	1·11	1·15	1·19	1·24	1·28	1·31
0·00015	0·68	0·76	0·82	0·91	0·97	1·05	1·10	1·14	1·18	1·22	1·26	1·29
0·0002	0·69	0·77	0·83	0·91	0·97	1·05	1·10	1·14	1·17	1·21	1·25	1·27
0·0003	0·71	0·79	0·84	0·92	0·98	1·05	1·10	1·13	1·16	1·21	1·24	1·26
0·0004	0·72	0·79	0·85	0·93	0·98	1·05	1·10	1·13	1·16	1·20	1·23	1·25
0·0005	0·72	0·80	0·85	0·93	0·98	1·05	1·10	1·13	1·16	1·20	1·23	1·25
0·0006	0·72	0·80	0·85	0·93	0·98	1·05	1·10	1·13	1·16	1·20	1·22	1·24
0·0008	0·73	0·80	0·86	0·93	0·98	1·05	1·10	1·13	1·15	1·19	1·22	1·24
0·001 and upwards.	0·73	0·81	0·86	0·93	0·98	1·05	1·10	1·13	1·15	1·19	1·22	1·24

be substituted for corresponding page in Hydraulic Manual.

TABLE XII.—Part 3—*continued.*

Co-efficients of velocity of discharge for surfaces having a frictional co-efficient $f = 0{\cdot}025$, suitable to canals and rivers under certain conditions (Kutter.)

For values of S.	For values of R in feet. 0·5	0·75	1·	1·5	2·0	2·5	3·	3·5	4·	4·5	5·	6·	7·
0·00005	0·38	0·44	0·49	0·57	0·62	0·67	0·71	0·74	0·77	0·79	0·81	0·85	0·88
0·0001	0·41	0·47	0·52	0·59	0·64	0·68	0·71	0·74	0·76	0·78	0·80	0·83	0·86
0·00015	0·42	0·48	0·53	0·60	0·64	0·68	0·71	0·74	0·76	0·78	0·79	0·82	0·85
0·0002	0·43	0·49	0·54	0·60	0·65	0·68	0·71	0·73	0·76	0·77	0·79	0·82	0·84
0·0003	0·44	0·50	0·54	0·60	0·65	0·68	0·71	0·73	0·75	0·77	0·79	0·81	0·83
0·0004	0·45	0·50	0·55	0·61	0·65	0·68	0·71	0·73	0·75	0·77	0·78	0·81	0·83
0·0005	0·45	0·50	0·55	0·61	0·65	0·69	0·71	0·73	0·75	0·77	0·78	0·81	0·83
0·0006	0·45	0·51	0·55	0·61	0·65	0·69	0·71	0·73	0·75	0·77	0·78	0·81	0·83
0·0008	0·45	0·51	0·55	0·61	0·65	0·69	0·71	0·73	0·75	0·77	0·78	0·80	0·82
0·001 and upwards.	0·45	0·51	0·55	0·61	0·65	0·69	0·71	0·73	0·75	0·77	0·78	0·80	0·82

To be substituted for corresponding page in Hydraulic Manual.

Demy 8vo., 560 pp., 28s.

HYDRAULIC MANUAL AND STATISTICS.

Part I.—Working Tables and Explanatory Text, intended as a Guide in Hydraulic Calculations and Field Operations.

Part II.—Statistics of Rivers, Canals, Water Supply, Agricultural Products, and Analyses of Water.

By LOWIS D'A JACKSON, A.I.C.E.

NOTICES AND OPINIONS.

"The first duty of a critic is to enable his readers to form a general notion of the work under review without having, as he has, the book itself to refer to when any point requires elucidation. A little patience also is required before the intention and scope of a work can be fairly appreciated by one making its acquaintance for the first time, and it is only reasonable, therefore, to assume that on these matters the author is at least as good a judge as the critic, and should consequently be allowed to speak for himself. Adhering ourselves to the principles enunciated, we may state that Mr. Jackson's work consists essentially of three parts—the first, the 'Hydraulic Manual' proper, comprising 220 pages of matter; the second about a hundred pages of 'Working Tables,' and the third a rather smaller mass of statistics and information relating to Indian canals, rivers, and irrigation works generally.

"'To aid the hydraulic engineer in his calculations by means of a collection of working Tables based on the most improved modern principles, and by a small amount of text setting forth these principles, and giving all the necessary formulæ in a concise manner; also to serve as a guide in hydraulic field operations by giving short *résumés* of the modes adopted in the field by the engineers whose experiments have been particularly eminent in producing practical and theoretical results'—is the object of the manual, expressed in the author's own words. It is further stated that 'the second part of the manual, annexed to the first in accordance with the wishes of the Secretary of State for India, consists entirely of hydraulic and meteorological statistics, the former principally, and the latter altogether Indian,' but we think the author barely does justice to himself in this statement, since descriptions of the physical features of the larger Indian rivers, historical notices of the leading irrigation canals, and data relating to dry crops would hardly be found in a work consisting 'entirely of hydraulic and meteorological statistics.'

"Such being the aim of the author, we have now to consider the degree of success achieved, and we need devote little space to the purpose, since it is impossible to abstract the pith from a compilation of this kind, and we must therefore, if we approve of the work—as we do—advise such of our readers as are interested in the subjects discussed to obtain it and judge for themselves if it is not likely to be useful to them.

"We are glad to notice that Mr. Jackson has availed himself of Ganguillet and Kutter's laborious analyses of hydraulic data and the tables and formulæ deduced by them: he is the first in the field in this respect. The presence of these tables in Mr. Jackson's book will therefore suffice in itself to render it an extremely useful work to put in the hands of a student, since it will save him all the annoyance and loss of time consequent upon the attempt to reconcile the various conflicting formulæ advanced by Neville and others in so-called hydraulic text books.

"We differ from the author in thinking that the Indian information will be of comparatively little interest to home engineers To our mind these statistics and brief descriptions of rivers, canals, crops and other matters are especially interesting, since they give us information which we perhaps might not always know how otherwise to obtain, or at least would not be able to devote the necessary time to procure by wading through a mass of Indian reports and blue-books.

"We have only to add that the work does credit to the publishers, and that care has been taken to eliminate the errors which are apt to creep in where, as in the present case, numerous tables and innumerable figures have to be set up."—*Engineering*, *7th April*, 1876.

"London, 14, St. James's Place, S.W.
"*December* 2, 1875.

"Sir,

"The Russian Imperial Minister of Public Works, His Excellency R. Possiett, in a letter addressed to me on the 1st of November, 1875, Sub. No. 1,303, wishes me to express to you His Excellency's gratitude for the valuable and interesting work lately written by you under the title of 'Hydraulic Manual and Statistics,' one copy of which has been submitted by me to His Excellency, according to your desire.

"This work, by order of the Minister, is to be translated into Russian, and in the meantime the Minister desires some more copies for distribution among our special Engineers.

"I have the honour to be, Sir,

"Your obedient Servant,

"Al. Gorloff,

"*Maj.-Gen. Aide-de-Camp of H.M. the Emperor, and Russian Mil. Attaché to the Russian Embassy.*"

London: W. H. ALLEN & Co., 13, Waterloo Place, S.W.

8vo, cloth, pp. 48, 2s 6d.

SIMPLIFIED WEIGHTS AND MEASURES,

ON A NATURAL SYSTEM APPLICABLE TO MOST CIVILIZED NATIONS.

By LOWIS D'A. JACKSON, A.I.C.E.

"Mr. Jackson's pamphlet is divided into nine sections, of which the first has for caption 'The Defects of the Present Systems [of weight and measure], and the Necessity for their Simplification.' We hardly need to be reminded of the very obvious deficiencies of our systems of weight, etc., and this appears to have been the view of the author, who has devoted this short section chiefly to dividing the world at large into several categories, discriminated according to their attitude towards any plans of reform. It is rightly taken for granted that no one will deny the expediency of some changes.

"The second section deals with the defects and advantages of the French metrical system, which the author pronounces to be 'the most unpractical system of weights and measures that has perhaps ever been invented,' and one which 'required the most theoretical, sentimental, and revolutionary of nations to adopt it.' Let it be noted in passing that Mr. Jackson, writing for an English audience, could not have characterized this system by three adjectives more fatal to its pretensions. The 'unpractical' nature of the metric scheme is shown by the fact that the 'Italians, Spaniards, Portuguese, and Belgians (who have formally adopted this system) cannot refrain from using their own measures as well.' Holland and the Canton Vaud can alone be said to have made it the unique system of the land. This the Dutch have been able to do by retaining the ancient *names* while adopting the new measures, the Canton Vaud is subject to constant inconveniences in its intercourse with the other cantons, which have formally, though not practically, adopted the system. Russia, Germany, England, and America are plainly not favourable to it. Its advantage is that its terminology is a kind of '*lingua franca* among scientific men, as the French language was at one time the language of diplomats.' A point which the author does not make is that its currency is thus greatest among a class which does not require it. An example of this may be taken from thermometry. During Auwers' investigation of the parallax of 61 *Cygni* at Königsberg, three thermometers were used—a Celsius, a Réaumur, and a Fahrenheit. The very difference between these scales served as a check against error to the astronomer, while for any ordinary purpose such a multiplication of scales would be bewildering. Mr. Jackson maintains that even for the masses the metric system is no more than 'a pleasing snare.' The metre is a rather long yard of 3.2809 feet, and had its length assigned to it from the belief that it was one-ten-millionth of the quadrant of the earth. Subsequent investigations have shown that it is not so, and therefore it is no longer 'a natural standard,' but must be looked at simply as an inconvenient and revolutionary yard. The decimal subdivision and multiplication is of the highest value, but many of these multiples and sub-multiples 'are rather names than measures.' 'Who requires the decimètre, the decamètre, hectomètre, or myriamètre?' Furthermore, the decimal division can be applied to any unit of length as well as to the metre, and that unit may be chosen from among the standards which use has shown to be *convenient* and which have been made familiar through long service.

"The French measures of surface are even worse off, as but one of them agrees with one of another nation. Of the measures of capacity, the litre is the only one of practical value, and the only one in general use. Similarly in weights, the 'gramme is too large for the delicate purposes for which we employ grains, and the kilogramme is about double the pound of any other nation.' Even in France, the *half* kilogramme is the weight in common use; and throughout the interior the old measures of land are in use to this day. 'The attempt to decimalize the right angle by dividing it into 100 *grades* instead of 90 degrees, may be considered as the *reductio ad absurdum* of the system;' and, although this is not a necessary part of the metric system, the expressions of the author can be defended. The practical proof of this is that the centesimal tables of Borda, where the quadrant is so divided, are now completely out of use, while the capital tables of Bremiker (5 and 4 place), where the *degree* is divided decimally, are coming rapidly into vogue. The true idea seized by Bremiker is that the *unit* is to be determined by convenience, but that when once chosen it must, if possible, be divided decimally. We say 'if possible,' meaning by this that *convenient* sub-multiples, even if not decimals, must not be destroyed. The tenth of a foot, for example, can never replace the English inch, except for a few special applications in levelling, etc. *Convenience*, as proved by use, is the first test for a unit. Among American coins the eagle, the dollar, and the twenty-cent, piece, although decimalized multiples and sub-multiples, are artificial, not real, units. This choice of units which experience has shown to be convenient, is one of the points upon which Mr. Jackson chiefly, and we think rightly, insists. The admirable features of the metric system are its uniformity, its decimal divisions, and the mutual dependence of its various parts. The peculiarly French demand for something 'logical' (so humourously treated by Richard Wagner in his essay on 'Le Freischütz') has resulted, according to the views here laid down, in the creation of a scheme which is abstractly perfect, but really visionary.

"The succeeding sections treat of the 'Inadvisability of any sweeping changes,' and of the 'Objects to be kept in view in remodelling our system of weights and measures,' and contain useful and instructive comparative 'Tables of weights and measures of all nations.' These, if made fuller, would have enhanced the value of the work as a book of reference, although they are full enough for the argument.

"The most important section of the book is devoted to the exposition of a 'rational system of simplifying British weights and measures.' The author proposes to take as a basis a *mile*,* which is not to be the old London mile of 5,000 feet, nor yet the statute mile (since 1824) of 5,280 feet, but a *mile* common to all nations—the geographical mile,† Divide this into 6,000 new *feet* = 2,000 *yards*, etc. Each of these *feet* and *yards* will be only about one per cent. greater than the foot and yard. The square *mile* is to be divided into 900 *acres*, the *acre* differing by about three per cent. from the acre. The *cubic foot* is increased four per cent. The *cubic foot* of water is divided into five gallons, each three-tenths larger than the gallon, and the *gallon* is divided into ten *pints*, which vary but four per cent. from the pint. The new *pound* is the weight of a *pint*, the *grain* is the weight of a *minim* of distilled water. The *ounce* differs four per cent from the former ounce. 'None of these small measures can lead to an overdose of medicine through a mistake' an important point in the transition period. 'It is to be noticed that the proposed new measures of length, surface, and capacity vary only one, two, three, and four per cent. from the old ones.' The *pound* and *ton* are changed by the greatest percentages.

"The system thus proposed is a convenient one throughout if we take the *foot* as the unit of length (and the square *foot* or *yard* as that of surface), instead of taking the *mile*, as the author proposes, and it is decimalized wherever possible. The *mile* in this system should be considered simply as a multiple which is convenient and common to all nations, but the foot and yard, are, and will remain, the English standards of length. The chief changes in the proposed system are in the measures of capacity and of weight, where they are of least account. Whatever may be thought of this system (which the author shows to be readily applicable to the measures of Germany, Austria, etc.) it seems clear that its fundamental idea is right. The present standards of length in England and America are practically convenient and quite as much 'natural' standards as the metre. Their length in terms of the earth's quadrant is equally well known (through the labours of the English Ordnance Survey, the Coast Survey, etc.) Any change should preserve these, adding to them useful multiples and sub-multiples on a decimal system, and these multiples should vary as little as possible from existing measures."—*The Nation*, 1st *March*, 1877, *No.* 609.

---

* For shortness, we write the new measures in Italic, the old in Roman letters.

† The geographical mile intended by the author and generally understood by men of science is one sixtieth of a degree of longitude on the equator, measured on Bessel's theoretical spheroid, and is equal to 6086.4275 English feet. Unfortunately, this term is ambiguously used, being frequently applied to the nautical mile etc. Some of our best books are not free from this error.

London: E. and F. N. SPON, 48, Charing Cross.

New York: 446, Broome Street.

8vo, cloth, 12s. 6d.

The New Formula for Mean Velocity of Discharge of Rivers & Canals.

By W. R. KUTTER.

Translated from Articles in the *Cultur-Ingénieur*, by Lowis D'A. Jackson, A.I.C.E., Author of "Hydraulic Manual and Statistics," "A Curve Book," "Simplified Weights and Measures," &c.

NOTICES OF THE PRESS.

"About a year ago, when reviewing the very important investigations of Captain Cunningham, R.E., on the flow of water in the Ganges Canal, we referred to the above work of Herr Kutter, and expressed a wish that the Institution of Engineers should at least publish an abstract, if no translator or publisher could be found to present English engineers with the whole work.

"As a result of our suggestion the present translation has been made, and we welcome its appearance none the less that the duty of translation has been assumed by an engineer whose previous studies in the same field render him undeniably competent and trustworthy.

"We have frequently had occasion to ridicule the superstitious reverence with which too many of our so-called hydraulic engineers regard the nostrums of old authorities in their particular branch of science, and we may now the more properly take occasion to state that we consider the present work to be a specific against infection from these old sources of mischief. One minute's glance at the tables will dispel at once and for ever a host of illusions, and a careful reading of the whole work will prove most valuable to students, and interesting to all.

"The most convenient, and consequently the most generally employed, formulæ for the flow of water in open channels are of the form

$$v = c\sqrt{rs}$$

where v is the mean velocity, r the hydraulic mean depth, s the fall of the water in a length of unity, and c the experimental coefficient. Now, in a given channel, and within certain limits of variation in the depth and surface fall of the water, the value of c remains practically constant, and it has been but too commonly assumed that it will similarly remain constant when applied to other channels widely differing in section and fall. Thus in Beardmore's tables, one value of c does duty for all the cases tabulated, and the author has taken care to notify that the same value will apply to cases outside the limits of his tables, since he says the latter may be readily extended if it be remembered that to get double the discharge you require four times the fall, and so on. What years of laborious research have been wasted in the past, and would be spared in the future, were such an assumption only approximately true! But, unhappily it is about as unwarranted an assumption to take a constant value for c as it would be to assume a constant length for a degree of longitude. The latter will vary but little within certain limits of latitude, and the former will similarly vary but little within certain limits as regards depth of water, fall of the channel, and condition of its surface.

"What the value of the coefficient c as derived from innumerable experiments is in different cases, it is the object of Kutter's tables and diagrams to show. When we add that within the practical limits assumed in the tables, the value (metrical measures) ranges from 15.5 to 69.6. it will be readily seen that the assumption of a constant of 50 for all cases—which is about the equivalent of Beardmore's tables—may lead to some remarkable errors.

"We are of opinion, therefore, that the present translation of Kutter's work has appeared none too soon, and that it will fill a long-standing void in the literature of hydraulic science."—*Engineering.*

"The fact that the erosion of the bed and destruction of the works of the Ganges canal were due to the reliance placed by Colonel Cautley, R.E., in common with the majority of the English engineers of the day, on the velocity-formula of Dubduat, which proved, in this instance, mischievously misleading, is a proof of the great practical importance that attaches to a thorough knowledge of hydraulic law, in so far as it is at present ascertained. Considerable gratitude, is therefore, due to the enterprise, whether it be that of the author or that of the publisher, which has led to the publication of a book which must have been so costly to print as Kutter's 'Hydraulic Tables,' which are reproduced in a clear and intelligible form by the translation of Mr. Jackson. The public addressed by such a work is not large; but to that public it has an indispensable value. Herr Kutter has brought the new formulæ of D'Arcy and Bazin, and the new formula of the American engineers, Humphreys and Abbot, to the test of a tabulated series of experiments collected from very wide observation From a comparison of eighty-five measurements of discharge in Swiss rivers, it appears that the formulæ of D'Arcy and Bazin, give velocities within 4 per cent. of those actually observed; while the formula of Chezy-Eytelwein gives a velocity of 252, and that of Humphreys and Abbot a velocity of 46, against an observed velocity of 181, on the average of the experiments. The American formula is based on measurements of the flow of the Mississippi and its affluents, where the volumne is immense and the inclination of the bed is very small. It appears, from what we have above stated, that the application of such a formula to the flow of water under other conditions is entirely out o' the question. The subject is of too technical a nature for us further to pursue; but we are able thoroughly to recommend the book; and that the more so because, in spite of the extreme importance of the subject, both as relates to our own country and to India, hydraulic engineering is not a branch of the art and science of the engineer, as to which Great Britan can with any truth be said to occupy a leading, or even a satisfactory, position. Herr Kutter's work, which appeared in 1870, was immediately translated into French, Dutch and Italian. English engineers are indebted to Mr. Jackson for the manner in which he has translated it into their own tongue."—*Athenæum.*

"This translation will be of interest to all engineers in India who are familiar with the large work, 'Hydraulic Manual and Statistics' of the translator, now translated into Russian. Hydraulic engineers of every description, from the engineer of experience down to the extra assistant commissioner, who tries to find out how much irrigation water may be conveyed in a small trench of supply, will be glad to learn something of the way in which the only trustworthy formula for calculating discharges of water in open channels of every size and inclination, and in any material has been eventually arrived at. It has been deduced from experimental observations on rivers of all sizes, up to the Mississippi down to trenches a few inches wide, with inclinations from those scarcely appreciable down to the steep gradient of Swiss torrents; and allowance is made for every material of surface, from smooth cut-stone, planed and unplaned timber, rubble, earth, and grass-covered and pebble impeded mud. The tables given in this work enable the formula to be applied in practice in metrical measures, with the least amount of work: the diagram answers the same purpose both for metrical and for English measures. The application of this formula and tables for English measures having been already carried out in Mr. Lowis Jackson's 'Hydraulic Manual,' this translation may be considered as a useful adjunct to it.

"We need hardly add that perfect confidence may be placed in this recast, as well as translation, of one of the most important works on Hydraulics of modern times; the translator's long experience on canals and works of irrigation in Northern and Southern India, as well as in South America, in England, and on the Continent—being, in fact, a lifetime given to this subject—and his former position in charge of the province of Berar for irrigation, render him entitled to be considered competent in this task.

"He has, besides remodelling the whole of this work, added some perfectly new conversion tables and other matter to it which render it useful as a book of reference on weights and measures."—*Allen's Indian Mail.*

"'The New Formula for Mean Velocity of Discharge of Rivers and Canals,' is an English translation by Mr. Lowis Jackson, A.I.C.E., from a work in German by Herr Kutter, which has already circulated widely in many parts of Europe. Hydraulic science in England appears to have lagged far behind other branches of engineering, in which our countrymen have kept the lead of other nations for years past. Even the great field which India has offered to our engineers seems in this respect to have been but indifferently worked, owing in great measure, to faulty theories and defective or mistaken methods. The new formula claims to point the way to more successful applications of hydraulic science in the future, and the claim is certainly supported by the good opinions of some experienced judges in this country, as well as in others, not forgetting Madras."—*Home News.*

London: E. and F. N. SPON, 48, Charing Cross.

New York: 446, Broome Street.

THIRTEEN YEARS AMONG THE WILD BEASTS OF INDIA.

Their Haunts and Habits, from Personal Observation; with an account of the Modes of Capturing and Taming Wild Elephants. By G. P. Sanderson, Officer in Charge of the Government Elephant Keddahs at Mysore. With 21 full page Illustrations and three Maps. Fcp. 4 to. £1 5s

---

THE INDIA DIRECTORY.

For the Guidance of Commanders of Steamers and Sailing Vessels. Founded upon the Work of the late Captain James Horsburgh, F.R.S.

Part I.—The East Indies, and Interjacent Ports of Africa and South America. Revised, Extended, and Illustrated with Charts of Winds, Currents, Passages, Variation, and Tides. By Commander Alfred Dundas Taylor, F.R.G.S., Superintendent of Marine Surveys to the Government of India. £1 18s.

Part II.—The China Sea, with the Ports of Java, Australia and Japan and the Indian Archipelago Harbours, as well as those of New Zealand. Illustrated with Charts of the Winds, Currents, Passages, &c. By the same. (*In the Press.*)

PHYSICAL GEOGRAPHY.

By Professor D. T. Ansted, M.A., F.R.S., &c. Fifth Edition. Post 8vo., with Illustrative Maps. 7s.

Contents:—Part I.—Introduction.—The Earth as a Planet.—Physical Forces.—The Succession of Rocks. Part II.—Earth—Land.—Mountains.—Hills and Valleys.—Plateaux and Low Plains. Part III.—Water.—The Ocean.—Rivers.—Lakes and Waterfalls.—The Phenomena of Ice.—Springs Part IV.—Air.—The Atmosphere. Winds and Storms.—Dew, Clouds, and Rain.—Climate and Weather. Part V—Fire.—Volcanoes and Volcanic Phenomena—Earthquakes. Part VI.—Life.—The Distribution of Plants in the different Countries of the Earth.—The Distribution of Animals on the Earth.—The Distribution of Plants and Animals in Time.—Effects of Human Agency on Inanimate Nature.

"The Book is both valuable and comprehensive, and deserves a wide circulation."—*Observer.*

THOMPSON'S LUNAR AND HORARY TABLES.

For New and Concise Methods of Performing the Calculations necessary for ascertaining the Longitude by Lunar Observations, or Chronometers; with directions for acquiring a knowledge of the Principal Fixed Stars and finding the Latitude of them. By David Thomson. Sixty-fifth edit. Royal 8vo. 10s.

Demy 8vo., 18s. 6d.

ILLUSTRATED HORSE DOCTOR.

Being an Accurate and Detailed Account, accompanied by more than 400 Pictorial Representations, characteristic of the various Diseases to which the Equine Race are subjected; together with the latest Mode of Treatment, and all the requisite Prescriptions written in Plain English. By EDWARD MAYHEW, M.R.C.V.S.

CONTENTS.—The Brain and Nervous System.—The Eyes.—The Mouth.—The Nostrils.—The Throat.—The Chest and its contents.—The Stomach, Liver, &c.—The Abdomen.—The Urinary Organs.—The Skin.—Specific Diseases.—Limbs. The Feet.—Injuries.—Operations.

"The book contains nearly 600 pages of valuable matter, which reflects great credit on its author, and, owing to its practical details, the result of deep scientific research, deserves a place in the library of medical, veterinary, and non-professional readers."—*Field.*

"The book furnishes at once the bane and the antidote, as the drawings show the horse not only suffering from every kind of disease, but in the different stages of it, while the alphabetical summary at the end gives the cause, symptoms and treatment of each."—*Illustrated London News.*

Demy 8vo., 12s.

ILLUSTRATED HORSE MANAGEMENT.

Containing descriptive remarks upon Anatomy, Medicine, Shoeing, Teeth, Food, Vices, Stables; likewise a plain account of the situation, nature, and value of the various points; together with comments on grooms, dealers, breeders, breakers, and trainers; Embellished with more than 400 engravings from original designs made expressly for this work. By E. MAYHEW. A new Edition, revised and improved by J. I. LUPTON, M.R.C.V.S.

CONTENTS.—The body of the horse anatomically considered. PHYSIC.—The mode of administering it, and minor operations. SHOEING.—Its origin, its uses, and its varieties. THE TEETH.—Their natural growth, and the abuses to which they are liable.

FOOD.—The fittest time for feeding, and the kind of food which the horse naturally consumes. The evils which are occasioned by modern stables. The faults inseparable from stables. The so-called "incapacitating vices," which are the results of injury or of disease. Stables as they should be. GROOMS.—Their prejudices, their injuries, and their duties. POINTS.—Their relative importance and where to look for their development. BREEDING.—Its inconsistencies and its disappointments. BREAKING AND TRAINING.—Their errors and their results.

24mo., cloth, 3s. 6*d.*; roan tuck, 5*s.*

POCKET LOGARITHMS.

Arranged and Accented

By LOWIS D'A JACKSON, A.I.C.E.

The object of this concise pocket book is to supply, in an exceedingly small compass, such an amount of logarithmic tables as will answer the purposes of practical men in the short and frequent calculations of every-day life.

The four-figure logarithms have their final figures accented in a simple manner, being marked for augmentation and diminution, so that they may always be used without error in obtaining four figures in numbers. Without such marking, four-figure logarithms fail in this object, as for instance:—the logarithms both of 8439 and of 8440 are identical, being 3·9263; in the same way also the logarithms of 9969, 9970, and of 9971 are identical, being 3·9987; but in the notation adopted by Mr. Jackson, the logarithm of the first of the three numbers would be marked 3·998$\bar{7}$, with a dash above the final figure, showing that it is considerably augmented, having an approximate or mean value of 3·99867; the logarithm of the second number is left unmarked 3·9987, indicating a firm final figure lying between the limits of 3·99869 and 3·99871; while the logarithm of the third number is marked 3·998$\underset{\cdot}{7}$, having the final figure marked with a dot underneath, showing that it is a considerably diminished figure, having an approximate or mean value of 3·99873. These simple marks, which can be easily used by the calculator, hence enable him to use four-figure logarithms with precision, and thus surmount the difficulty hitherto presented by them.

In addition to the accented four-figure logarithms, the book contains some five-figure logarithms, as well as a small set of eight-figure logarithms, extending to the range necessary for calculations of interest, annuities, &c. The logarithms of sines and tangents are also given to four and five figures, and are sufficient to meet the ordinary requirements of the engineer. At the end of all s a new set of conversion factors and equivalents, as well as other useful numbers, most of which have for their object, to facilitate conversions from, and into foreign measures; these factors being in all cases commercial equivalents suited to the ordinary temperature of 62° Fahrenheit, and not the scientific equivalents at the unfrequent temperature of freezing point.

The book is thus adapted to the purposes of the commercial, as well as the professional man, the banker and the actuary. To students—most of whom waste a considerable part of the period of their education in working out with seven-figure logarithms, the numerous mathematical examples necessary to enable them to digest and apply the laws they study,—the advantage of halving most of this time, by using these logarithms is an important consideration.

ALSO BY THE SAME AUTHOR,

NOTES, FORMULÆ AND MEMORANDA FOR SURVEY PRACTICE.

Including Land and Engineering Surveying, Levelling, Setting out, Route Surveys and Observations, Navigation, Surveys of Rivers and Coasts, and Military Surveying.

London: W. H. ALLEN & Co. 13, Waterloo Place, S.W.

Royal 8vo., 12*s*.

MAJ.-GEN. BOILEAU'S TRAVERSE TABLES.

A New and Complete Set of Traverse Tables, showing the Differences of Latitude and the Departures to every Minute of the Quadrant and to Five Places of Decimals. Together with a Table of the lengths of each Degree of Latitude and corresponding Degree of Longitude from the Equator to the Poles; with other Tables useful to the Surveyor and Engineer. Fourth Edition, thoroughly revised and corrected by the Author.

Demy 8vo., 648 *pages*, 12*s*.

ELEMENTARY MATHEMATICS.

A Course of Elementary Mathematics for the use of candidates for admission into either of the Military Colleges; of applicants for appointments in the Home or Indian Civil Services; and of mathematical students generally. By Professor J. R. YOUNG. In one closely-printed volume

"In the work before us he has digested a complete Elementary Course, by aid of his long experience as a teacher and writer; and he has produced a very useful book. Mr. Young has not allowed his own taste to rule the distribution, but has adjusted his parts with the skill of a veteran."—*Athenæum*.

Royal 8vo., 12*s*.

MILITARY SURVEYING AND FIELD SKETCHING.

The Various Methods of Contouring, Levelling, Sketching without Instruments, Scale of Shade, Examples in Military Drawing, &c., &c., &c. As at present taught in the Military Colleges. By Major W. H. RICHARDS, 55th Regiment, Chief Garrison Instructor in India, Late Instructor in Military Surveying, Royal Military College, Sandhurst. Second Edition, Revised and Corrected.